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[ILLUSTRATED.]

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Electricity Furnished by the Cartload.

The ball-room of Mr. Ogden Mills' residence, 69th street and 5th avenue, was lighted by means of the New York Isolated Accumulator Company's storage batteries, on Monday night, 16th instant. The occasion was a ball and house-warming, and a large assemblage of the leading members of New York society were present. The ball-room was brilliantly illuminated by sixty 16-candle power lamps—the electricity being supplied from the batteries which had been charged on the previous Friday at the Electrical Accumulator Company's factory, Newark, N. J.; carted to Mr. Mills' residence on Saturday; placed in position in the cellar, and connected with the lamps on Monday, and used from 9 30 P. M. until 3 30 A. M. the following day, without a single interruption of any kind.

The effect of the lights was very beautiful, and many expressions of admiration were heard on all sides.

Mr. Cornelius Vanderbilt ordered sufficient storage batteries to illuminate his Fifth avenue mansion on the occasion of his grand ball given on the 23d inst.

This is the first instance in which storage batteries have been used in America to furnish temporary light for special social occasions, and its success is likely to lead to a large business of this character in all prominent cities. This company uses the Faure battery.

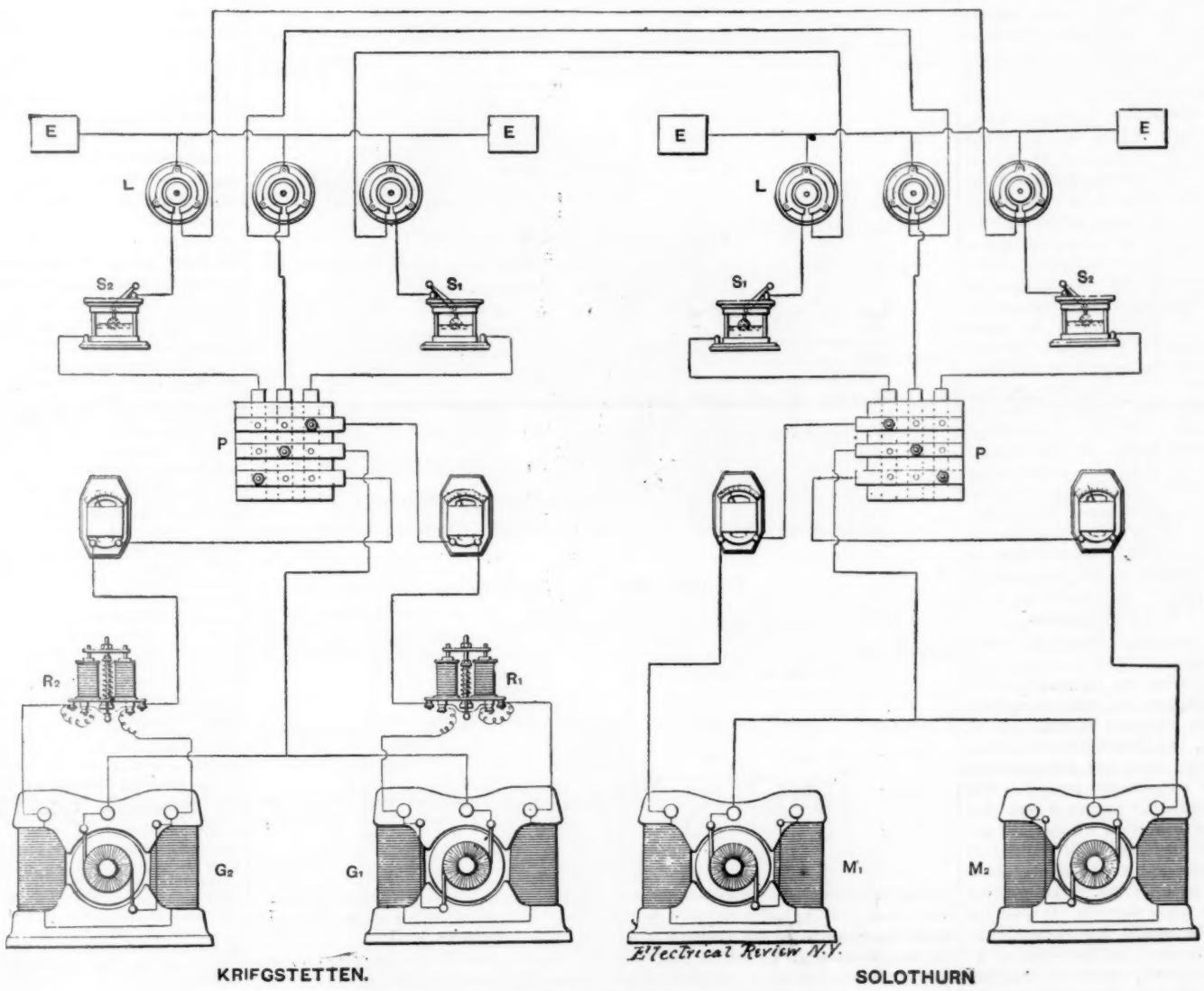
The New Military Balloon.

There is much mysterious talk in military circles at Paris, over a balloon, the invention of a M. de Villars, in which the problem of aerial navigation is said to be solved, at least to a degree never yet reached. M. de Villars' aim has been to direct his balloon by taking advantage of the several air currents which are to be met with at various heights. To do this it is necessary to ascend and descend frequently in the course of a voyage. But with balloons of ordinary construction this is impossible, by reason of the loss of gas and ballast which such maneuvers occasion. M. de Villars has no ballast to throw away, and he is able to retain the whole of his gas. Here lies the invention, which is kept profoundly secret. The inventor has, it is said, sold his secret to the French Government, to be used by it alone. Leaving out this part of the device, the balloon may be described as consisting of a double envelope of calico, covered with a special varnish, to render leakage of gas impossible. The additional weight thus occasioned is compensated by making the net of a new sort of fiber, which, while being twice as strong as hemp, is only half the weight. The car, which is attached in the usual manner, is described as cylindrico-conical, and is furnished with an electric motor driven by a dry battery. This motor will actuate a screw propeller, to be used only when it becomes necessary to temporarily direct the course of the balloon.

Sir John Pender, the veteran cable patron and official head of the Eastern Telegraph Company, has been by Queen Victoria honored with the distinction of K. C. M. G.

Electric Transmission of Energy.

Our esteemed contemporary, *Industries*, says that a committee have just issued their official report on the trials made on the 11th and 12th of October last with the plant as actually installed at Kriegstetten, Switzerland. Before quoting the results of these trials, it will be well to briefly refer to the general arrangement of this installation. At Kriegstetten there is a water power available representing about forty actual horse power, and the problem was to carry as much of this power as possible to a mill in Solothurn, the distance being $4\frac{3}{4}$ miles as the crow flies; but, allowing for deviations, the length of each circuit may be taken as about five miles. There are at Kriegstetten two generating dynamos, and at Solothurn two motors, coupled up on the three-wire system, as shown in the above illustration. The dynamos and motors are the Oerlikon type. Each dynamo weighs three tons 12 cwt., and has a Gramme armature 20 inches diameter and 14 inches long, the normal speed being



ELECTRICAL TRANSMISSION OF ENERGY BETWEEN KRIEGSTETTEN AND SOLOTHURN.

700 revolutions per minute. Referring to the diagram of connections, G^1 and G^2 are the generators at Kriegstetten, and M^1 and M^2 are the motors at Solothurn. R^1 and R^2 are electromagnetic switches which automatically come into action and short circuit the exciting coils in case of the current rising beyond a certain limit. This provision was introduced in order to guard against the destruction of the generator in case a short circuit should take place somewhere in the line. The current from each of the generators passes through an ammeter and then to a plug board, to which is also connected the balancing wire joining the negative brush of G^2 with the positive brush of G^1. The balancing wire is then carried direct to the middle one of the three lightning arresters L, and then to the middle wire of the line, whilst each of the outside wires is led through a liquid switch S^1 S^2, then to a lightning arrester, and to the line. Each lightning arrester consists of a circular metal disk, the edge of which is provided with projecting teeth, and situated in a concentric metal ring, the internal circumference of which is also provided with teeth, but not touching the teeth of the disk. All the disks are connected with a common earth wire and two earth plates E E. Should a flash of lightning strike the line, the current will leap across the intervening space between the teeth of the ring and those of the disk, and will thus be led to earth without passing through the machinery. The same provision against lightning is made at the motor station. The switches S^1 S^2 are of peculiar construction, and consist of a vessel containing a conducting liquid and a perforated metal ball dipping into it. When the current is to be switched off, the handle is turned so as to raise the ball out of the liquid; but the circuit is not immediately interrupted, since the liquid within the balls issues in fine streams out of the perforations, and so maintains the connection for a short time after switching off. As the liquid in the ball gets exhausted, and the streams become thinner, the resistance of the liquid connection is gradually increased to infinity, and thus causes the current to gradually diminish to zero. The line wires are supported on patent fluid insulators, and the average span is about 130 feet. Two sets of experiments were made. On the 11th of October only one generator and one motor were tested, whilst on the 12th of October both generators and both motors were tested. In the latter test the balancing wire was cut out of circuit as of no importance, when, as in these experiments, it was quite easy to regulate the load of each motor so as to fairly divide the work between them.

Electrical measuring instruments were fitted up at both stations in rooms sufficiently distant from the machinery, so as not to be influenced by stray magnetism. The current was measured by large tangent galvanometers, and Thomson mirror galvanometers, standard cells, and potentiometers were used to measure the pressure. The object in measuring the current at both ends of the line was to ascertain whether any appreciable leak took place. In addition to these purely electrical measurements, observations were made at the generator station regarding the water level in the head and tail race of the turbine, the position of the regulator on the latter, and the speed of the dynamos and turbine. After the transmission trial on the 11th of October was completed, the armature of the dynamo was taken out and replaced by a plain spindle provided at the end with a brake. The turbine was then started again under exactly the same conditions as were noted at the previous trial, and the power absorbed by the brake was measured. The comparison between the power thus measured and the electrical energy given out by the generator is evidently the commercial efficiency of the latter. On the following day both generators and both motors were tested in the same condition as prevails in actual practice, with the only exception that, as already mentioned, the balancing wire was cut out of circuit. This alteration, which could obviously not increase the efficiency of the whole system, was made to simplify the measurements. The power absorbed by the generators was computed on the basis of the previous day's trial from the observed conditions under which the turbine worked, whilst the power developed by the motors was on both days directly ascertained by means of a friction brake fitted to a first motion shaft common to both motors. A small correction was made for the power absorbed by this shaft when running idle. The following tables give the results as published by the committee.

An inspection of these figures will show that there is practically no loss of current by leakage on the line. In some cases the current measured at the motor station is slightly below that measured at the generator station; but the discrepancy is exceedingly small, and evidently due to personal or instrument errors, since in some other cases the current received by the motors appears to be even slightly larger than that sent out by the generators, which is obviously impossible. The second table also shows the influence of the air temperature upon the total resistance. The third table gives the power, and the fourth the efficiencies in percentages. It will be noticed that when one generator and one motor only were used, the commercial efficiency was slightly over 68 per cent.; but when both generators and both motors were used, this efficiency rose to about 75 per cent., which is clearly due to the higher voltage employed. On the whole, the result of these trials must be considered highly satisfactory, and Mr. C. E. L. Brown can be congratulated upon having succeeded in transmitting power over a distance of five miles with a loss not exceeding 25 per cent. It is needless to say that so high an efficiency could not possibly have been attained with any purely mechanical system of transmission.

I.—Electrical Measurements.

Time of Trial.	Electromotive Force.		Terminal Pressure.		Current Measured at	
	Generators.	Motors.	Generators.	Motors	Generators.	Motors.
11th Oct.	1211·6	988·6	1177·7	1041·2	14·20	14·17
" "	1237·0	1016·8	1186·8	1066·1	13·24	13·28
12th "	1836·5	1575·4	1753·3	1656·1	11·48	11·42
" "	2·29·0	1896·2	2058·0	1965·2	9·78	9·79

II.—Resistances and Loss of Pressure.

Time of Trial.	Resistance of Machines.		Line Resistance.	Pressure Lost in Line.		Temperature of Air. Centigrade.
	Generators.	Motors.		Calculated.	Measured.	
11th Oct	3·741	3·716	9·228	130·9	136·5	+7·5
" "	3·741	3·710	9·2·8	122·3	120·7	+7·5
12th "	7·251	7·060	9·044	103·7	97·2	+3.2
" "	7·240	7·042	9·040	88·4	92·8	+3·2

III.—Determination of Energy.

Time of Trial.	Internal Electrical Horse Power.		Terminal Electrical Horse Power.		Actual Horse Power	
	Generators.	Motors.	Generators.	Motors.	Supplied to Generators.	Obtained from Motors.
11th Oct.	23·76	19·03	22·72	20·02	26·15	17·85
" "	22·27	18·34	21·35	19·23	24·54	16·74
12th "	28·64	24·46	27·34	25·71	30·87	23·21
" "	28·29	25·21	27 37	26 13	30·87	23 05

IV.—Percentage of Efficiencies.

Time of Trial.	Electrical Efficiency.		Commercial Efficiency.		Total Efficiency of Transmission.	Remarks.
	Generators	Motors	Generators.	Motors.		
11th Oct.	90·8	93·7	86·8	89·1	68·3	One generator and one motor.
" "	90·6	91·3	86·9	87·1	68·2	
12th "	92·8	94·8	88·5	90·3	75·2	Both generators and both motors.
" "	91·6	91·4	88·7	88·2	74·6	

Electrolysis or Shock.

The question as to whether the physical injuries from electric currents were due to electrolysis of blood, dissociating the portion of the water which it contains, and thereby separating its constituent gases, which would cause death on reaching the heart, or whether the injury was primarily due to the nervous shock caused by electricity, has received a great deal of attention in some quarters early in the history of the general application of arc lighting, since it was anticipated that the fatalities from that source would be quite frequent, instead of rare exceptions, as has proven the practical experience in the matter.

The most doleful anticipations were had in regard to the terrible effect upon brave firemen, who, while cutting wires, were to be dashed as if by lightning, and it was even thought that the electricity would descend by the stream of water and enter the bodies of the hosemen managing the apparatus. Newspapers abounded in suggestions upon the method of using the stream of water as a conveyer of electricity, to serve as a warlike arm and a means of defense, particularly in regard to the defense of cities against mobs, and even for the defense of fortifications against scaling parties, were often seen. If memory serves aright, some one deemed such an arrangement worth patenting and obtained the necessary papers—although we do not speak by letter in the matter, but merely as a matter of recollection.

There were persons who would admit that both electrolysis and nervous shock were factors in extreme instances of prostration by electricity, but they differed very widely as to which was the prominent feature. The advocates of the electrolysis would adduce the rapid change from venous to arterial blood by passing a powerful current through a small sample from the abattoir, and the retort would be ready that one could not even feel the shock from the plating dynamo, but the nervous system would respond to the smaller current if the potential was high enough.

This controversy waxed similer to the points of the discussion between our medical friends of the allopathic and homeopathic schools as to whether the toxic and dynamic effect of drugs was the true potency to be used upon the human system.

We have always held aloof from these speculations, believing that they proceeded from an insufficient knowledge of facts to determine anything of value pertaining to the subject, knowing that in time there would be a sufficiency of results to furnish the medical precedents which would allow the formation of an opinion upon the matter.

When the use of alternating currents and transformers was first entered upon, there were numerous apprehensions that the nervous shock obtained from alternating currents of such high potential as those of the primary circuits would be attended with the most deplorable results to life. Such has fortunately not been the case, although the shocks received have been exceedingly frequent, from the fact that the installation of this apparatus has been to a great extent at the hands of artisans formerly employed with the direct systems of incandescent lighting, and therefore accustomed to the use of conductors conveying currents of such low potential that they could be handled without danger.

It is well known that there is no electrolytic effect from the alternating currents, and therefore the dissociation of the blood will not follow a short circuit through the human body; but the nervous shock from such a current largely exceeds that of the ordinary arc lighting continuous current.

This removal of one of the characteristics of electric lighting currents has afforded a means of comparison between the two physiological effects of electricity upon the system, and the impunity with which men have received through the alternating current circuit what would be undoubtedly fatal shocks in the continuous current system, indicates that the human body can withstand shock to a much higher degree than was anticipated, and that the use of alternating currents is not followed by the personal danger which was anticipated even by those who appreciated in the highest its electrical and commercial advantages.

It is said that in one of the hotels at New Orleans which is lighted by the alternating current system, there is a pet monkey kept for the amusement of the guests. After the alternating current wires were put into the building, the monkey found this a new source of enjoyment for himself and the entertainment of the guests. In the course of time, after the current was put upon the system, as the monkey was swaying to and fro by his hands from a wire at a point exposed by the location of a joint, he reached up with prehensile tail and caught on the other wire in the same position, and the short circuit singed off the last convolution of his tail without injury to the Simian.

After the manner of the greater development of his race as represented by humanity, who reform after they have seen and exhausted all the follies of the world, he has given up climbing around the columns of the hotel, having come to the opinion that it is an undignified spectacle and a useless waste of time; but he will sit round on the tessellated pavement, and if the visitor takes any notice of him will gladly accept the proffered peanut, then holding up the cauterized tail, will look between it and the visitor as if for sympathy; scarcely realizing that he has furnished one of the precedents for the settlement of disputed points upon the physiological effects of alternating currents. He might say in the words of the old parody:

"If I am Darwin's grandpa,
Why, then, don't you see
That what's a shock for man and beast,
Is a double shock to me."

Electrical Auxiliary Fire Alarms.

It is a singular fact that among the many useful electrical inventions and appliances which have marked such rapid progress in this science during the last few years, and which include valuable improvements in fire alarms, not until quite recently has any effort been made to connect street signal boxes with the buildings they are intended to protect, for the purpose of saving the valuable time now lost in reaching and obtaining access to the street box in order to pull in an alarm.

That the present fire alarm telegraph system remains in this respect practically as introduced in the year 1852, is undoubtedly due, not to the absence of a demand for such auxiliary service, nor to the want of appreciation of such a demand by inventors and owners of fire telegraph systems, but to the apparent difficulty of application in a manner not to interfere with the efficiency of the fire alarm system proper.

It is well understood that from the incipiency of a fire until the department is at work upon it, each minute is of great value, and in recognition of this fact, every possible appliance by which the smallest amount of time may be saved in transmitting the signal from the street box, and in responding thereto, has been adopted.

The keyless box is the result of an effort to save the time necessary to obtain access to a box after reaching it, but the use of this box is limited, for obvious reasons.

The apparatus of the Gamewell and other fire alarm telegraph companies to-day, is the result of years of experience and study, and it is but natural for these companies to look with disfavor upon proposed attachments to signal boxes, which might interfere in any manner with the reliable service heretofore given.

The auxiliary apparatus here illustrated, however (for which letters patent have been recently allowed) has been approved by the Gamewell Company, as meeting all possible objections in its application to street boxes, and was also endorsed by the chief engineers of the country at their last convention held at Atlanta, Georgia, in Sept., 1887, and it is believed that the system will commend itself to the officials of the fire departments generally as well as to insurance interests. It has been devised with a view to prevent false alarms arising from any disarrangement of its wires, and to protect itself from continued disarrangement by warning bells.

Any number of auxiliary alarm boxes may be employed with one set of apparatus, including battery, and this single system may cover any number of buildings located in the vicinity of the street box.

Whenever one of these boxes is used in case of fire, the street box with which it is connected, is operated, and at the same time a private continuously vibrating alarm going, which may be placed at such point as the service demands, is started, and which continues ringing until stopped by pressing a knob connected with the apparatus.

The danger of false alarms from disarrangement of its wires, is avoided by the peculiar method of wiring the system, and at the same time provision is made for a warning signal from a distant vibrating alarm bell, which is brought into action in case of a break in the closed circuit, or of a cross contact between the parallel wires running through the series of auxiliary boxes.

In order that any weakening of the battery or other defect in the system may be promptly detected, a simple testing arrangement is provided, consisting of a galvanometer, switch and resistance coil, by the use of which the entire system may be easily and quickly tested by any person of ordinary intelligence, even without electrical knowledge or experience.

It will therefore be understood that this system is designed to be as efficient and reliable in its application as the fire alarm system proper, to which it is a valuable auxiliary.

Fig. 1 is a view of the exterior and Fig. 2 of the interior of the auxiliary box used by this company.

The working parts are enclosed in a neat iron box 4 by 6 inches, the lower part of the door being of glass to be broken, and the hook pulled down in case of fire.

The upper part of the box contains a "return signal" buzzer, which operates instantly when the hook is pulled, and continues to vibrate until the mechanism of the street box is in motion.

The movement of the train in the street box throws a switch opening in the circuit about two seconds, thus stopping the vibrations of the buzzer in the auxiliary box.

The opening of the switch furthermore prevents another alarm from any auxiliary box on this particular circuit until it has been reset. This does not, however, interfere in any manner with the operation of the street box for subsequent alarms, which may be sent from the box itself in the usual manner.

The opening of the auxiliary circuit in such case is reported by a warning alarm bell as before described, so that the switch may be restored to its normal position at the proper time.

Figs. 3 and 4 are cuts of the interior of the "sector" and "winding" street boxes of the Gamewell Fire Alarm Telegraph Company, with auxiliary releasing devices attached.

The Electric Fire Protective Co., and the Auxiliary Fire Alarm Co., No. 15 Cortlandt street New York, have the system on exhibition, where all who are interested are invited to call and examine its workings.

Fig. 2.

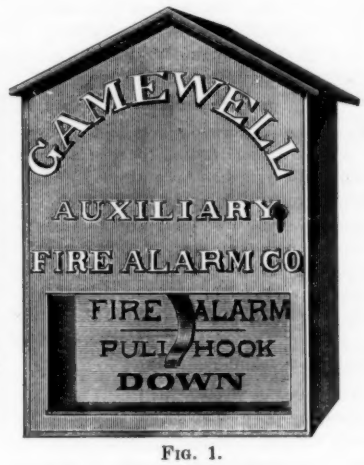


Fig. 1.

The Electric Fire Protection Co's New Auxiliary Fire Alarm.

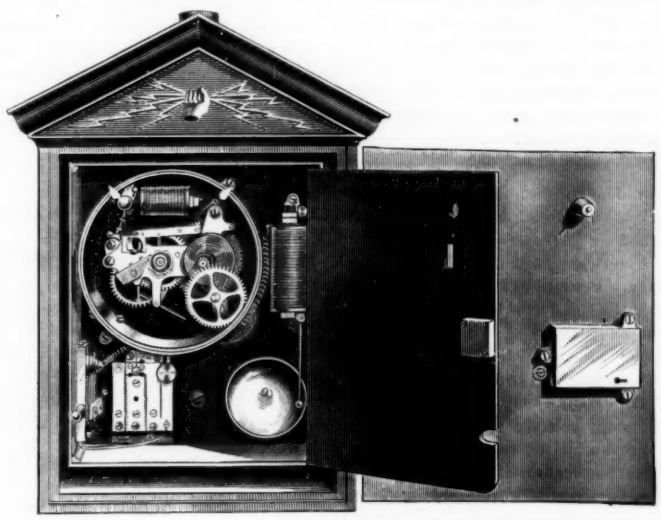


Fig. 3.

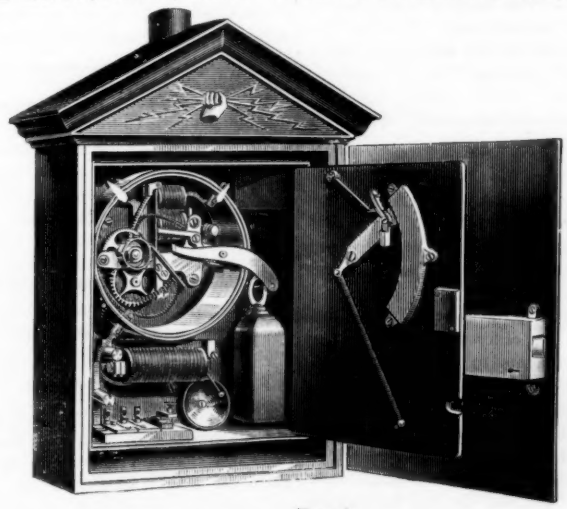


Fig. 4.

At Medina, N. Y., the Thomson-Houston Electric Company will, as soon as the weather permits, begin the work of stretching the wires and erecting the masts.

The latest triumph of the Billings & Spencer Co., Hartford, is the forging of a three and one-quarter pound commutator bar for the Edison Company. They have made a great success in the line of drop forging copper, and each month something new is developed.

It has been decided in Madrid that no theater is to be allowed to open its doors next winter unless it is lighted by electricity.

The Okonite Company have just received an order for wiring the United States steamer New Hampshire for electric lights.

The Rise in Copper.

After a long period of unprecedented dullness and cheapness the copper market has realized, since November 1, equally unprecedented activity, with a remarkable advance in price. Lake Superior ingot declined from 18c. per pound in 1883 to 10½c. in 1884. In 1885 it ranged from 10½c. to 11¾c. per pound, dropping in 1886 to 10c. From January to October, 1887, the fluctuations were between 10c. and 12c. per pound, with the market steady at 10½c. the middle of the latter month.

The French syndicate of metal speculators, says *Bradstreet's*, began to show their hand about that time, and their buying, coupled with favoring circumstances, ran the price up from 10.40c., October 22, to 17.90c. per pound, December 13, Chili bars advancing during the same period at London from less than £40 to £85 per ton. Lake ingot closed at 17.10c., as against 11.75c. at the beginning of the year.

The operations of the syndicate have been favored by diminished stocks in Europe and increased consumption all over the world. The great cheapness of the metal had resulted in its use in the arts to an extent never before known. At present values consumption is greatly curtailed. The English and French imports of copper last year amounted to considerably less than the year before, while the deliveries were larger. The exports from the United States in the ten months ending October 31 amounted to 16,465 tons of ore, as against 20,490 tons in the same time the year before, and the exports of ingot copper, etc., to 10,552,893 pounds, as compared with 14,966,107 pounds in 1886. The exports from Chili in 1887 were approximately 31,500 tons, or some 5,000 tons less than the previous year.

It is generally thought that the Chilian production cannot be greatly increased at once. In this country the strongest Lake Superior and Montana companies have been steadily improving their plants, and will probably turn out much more metal this year than last. The Calumet and Hecla Company, however, is still hampered by the consequences of the two fires in the mine last year, and its prospects are rather uncertain. The total output of the seven leading Lake Superior mines in the year 1887 was 44 642 tons, as compared with 46,691 tons in 1886. No considerable increase in output can be anticipated at present from the mines which were formerly active, but were idle in 1884–86. The total American production last year from all districts is put at 177,000,000 pounds, as against 157,000,000 pounds in 1886, and 166,000,000 pounds in 1885.

Manufactured copper has naturally advanced, in view of the extraordinary rise in the unwrought metal. This is felt in diminished business in the Connecticut copper and brass working towns. According to the prevailing opinion prices must continue higher for some time to come than during the former part of last year.

Electric Cure for a Cold.

Last night a German stood on the asphalt walk in Union Square. He was motionless. He did not lift his eyes from the shadows that the electric light threw upon the walk. He might probably be an artist studying the tracery of the branches thrown by the light upon the ground. So thought the policeman as he passed the silent man.

An hour passed. The man had not moved. Two hours went by. He was still fixed to the same spot.

"Hi!" called a darkey to the policeman. "I dunno but dere's sumpin de mattah wid dat ar man."

"Maybe there is," and the policeman shook the German gently. "What's wrong?"

The German pointed to the electric lamps just above them and then at the ground, and after that clasped his hands to his chest.

"See? de electricity strike de ground and den reflect against my chist, and cure de cold in my lungs."

"Ki-yi," said the darkey, with a grin.

The policeman walked on with a smile on his face.—*Telegram.*

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Electrical science is preparing a great number of "jawbreakers" for the next revision of the dictionary.

A very practical application of electricity is embodied in an electrically propelled dog-cart, a three-wheeled vehicle driven by an electric motor from a storage battery carried under the seats. On asphalt pavements a speed of nine miles per hour is attained. It is the work of Mr. Magnus Volk, of Brighton, England, and promises well.

Woodhouse & Rawson have lately brought out a new carbon button for microphones, which is distinguished by extreme hardness, sufficient to readily scratch glass by its homogeneity and absolutely smooth surface. It is, on the other hand, protected against atmospheric influences. It seems that this carbon is very much superior to that ordinarily employed in Blake microphones, and that it gives excellent results, especially for long distance telephone work.

A remedy in cases of severe shock by the electric current is attracting some attention both in this country and abroad; it appears that the same remedy has been long ago advised by the director of the Meteorological Observatory at Havana, who proposed it in 1855. It consists simply in as quickly as possible pouring over the entire body large buckets of cold water, for the space of an hour, if necessary, until the person gives some sign of life. It is also proposed as a remedy in case of lightning stroke. Although so long known, we think it well to keep it before our readers, as there is always a possibility of some prompt measures being needed in case of accident.

A good deal of discussion is going on in the English electrical journals about arc light carbons. They seem to condemn the "cheap American carbons" almost indiscriminately. Perhaps as time goes on it will be found in England as it has been here, that in carbons as in most other things, there is an "eternal fitness of things." We have long ago learned the truth that a carbon giving fine results say in a Thomson-Houston lamp, behaves villainously in a Brush lamp; and in the evolution of the systems, the carbon makers of this country have done a vast amount of experimenting to establish *grades*, which should be adapted especially to the respective systems; grades which do not differ in price or quality, but do differ materially in character as to hardness, temper, etc. But it by no means follows that, because a particular carbon misbehaves in a given lamp, it is inferior: it is simply in the wrong lamp. If some of the English plant owners will bear this in mind, they may yet bless the "cheap American carbons."

BELL WINS IN MEXICO.

A dispatch from the City of Mexico, Jan. 19, says that a decision was rendered that day by the First District Court of the Republic affirming the validity of the Bell telephone and Blake transmitter patents under the laws of Mexico.

The defendants in the case, a German mercantile house, are ordered to deliver their stock of instruments to the Mexican Telephone Company, to make a statement of their profits and hand them over, and to pay all the costs. The defendants will appeal to the Supreme Court.

The Mexican Telephone Company have made a hard fight, and the case has excited much interest.

The case had its origin in the introduction there of exact copies of the Bell Telephone Company's instruments by the German house and their use in different parts of the republic.

Many German imitations of American inventions are current in Mexico and Central America, especially of sewing machines. Colt's revolvers are exactly imitated by Spanish manufacturers who sell their goods there.

A GOOD ANSWER.

Some time ago it became widely known that a leading electric light manufacturing company required a new superintendent, and myriads of applications were received, phrased in every variety of orthography, etymology, syntax and prosody, as the old grammar states to be the various divisions of language.

One application was from a man who stated his early history and also his later experience as foreman of shops, giving no references, but repeating the names of a number of people whom he said were acquainted with him, and would, no doubt, answer inquiries if they were addressed to them.

But the salient part of the letter was in the simple expression, 'I will come to your works and let you look me over and make up your mind whether I will do."

The president of the company, on reading that letter, said, "This is the first application which seems to recognize our position as owners of the property, as the other applicants have all said that they are ready to come and look the works over."

The result of the meeting was, that they concluded that the man would do—and moreover he has done, in a very successful manner, managing the works with a great deal of enterprise and profit to the company.

NEW BOOKS.

MANAGEMENT OF ACCUMULATORS: By Sir D. Salomans, Bart. Published by Van Nostrand.

It is a real pleasure, in these days of abstruse and mathematical works on electrical subjects, to read one which is not bristling with equational pyrotechnics. Sir Salomons is to be congratulated for having given in this revised edition a vast amount of information, not merely about the care of storage batteries, the detection of and remedy for faults arising in them, but also a great many very useful points about engines, dynamos, instruments, and fittings. The author makes no attempt at style, avoids all abstruse expressions, and gives us a work which should be in the hands of every man who has the responsibility of looking after a storage plant. The information is conveyed in such simple terms that "he who runs may read," and the price of the book is in reach of all.

FIRST STEPS IN ELECTRICITY. By Charles Barnard.

This is just what its title indicates, and is a simply written little book intended to give a general idea of electricity in the most elementary manner. Many simple experiments are described, and the book is admirably adapted for the home circle and the entertainment of the rising generation.

The stockbrokers, as well as other enterprising traders in Chicago, have long enjoyed the luxury of one or more private wires, running east and west of that city. Stockbrokerage has fallen off to such an extent that retrenchment is inscribed on the banners, and many of these lines, especially the wires to New York, are being given up. Such a wire costs $15,000 to $20,000 per annum. It is said that, by May 1st, only about one-half the number in use a year ago will be running.

The copper market was easy and declining all the week. The decline has taken place in spite of the fact that supported reports are in circulation, of the closing of contracts by the French syndicate for the three years' production of the Rio Tinto mines and a similar contract with the Mason & Barry Co. The syndicate is also reported to have closed a three years' contract with the Arizona Copper Company, and it is believed the production of Anaconda (Butte Mon.), Matte, has been secured also. Jere. Abbott & Co., of Boston, the eastern agents of the syndicate, have made a contract for the three years production of the Tamarack mine at Lake Superior, which is estimated at about 15,000,000 pounds a year.

OUR CHICAGO LETTER.

(From a Special Correspondent of the ELECTRICAL REVIEW.)

The Central Electric Company have accepted and placed upon the Chicago market, a wire, which, as a substitute for the ordinary painted wire, is a decided improvement. The opinion of the writer on wires of the undertaker variety is tolerably widely known—they are not worth three hurrahs in an ice producers' convention.

The Candee wire above referred to, while costing a trifle more than the underwriter's, is worth for ordinary purposes far more than the difference in cost. There are still benighted towns where outside wires are strung overhead, and for all such the Candee wire is a valuable substitute for the underwriter's.

In an order for electrical goods received by a well-known establishment here a few days since was

"15 pounds Bologna sausage."

The butcher asked Mc where his new saloon was, for which the purchase was made. "They were good sausages," Reid says, for he tasted them.

The common council has decided that there is no authority under which a telephone license could be made to stick.

Then the following resolution, offered by Alderman Wheeler, was accepted.

Resolved, That the Commissioner of Public Works is hereby directed and instructed to issue no further permits to the Chicago Telephone Company to use the streets and alleys of the city of Chicago for telephone purposes until the further order of the council.

Just at this particular season of the year, this is virtually a blank cartridge so far as damage to the telephone company is concerned. But in the spring, unless some compromise is effected, the company will be in a hole.

The regular meeting of the Chicago Electric Club was held on the 9th. It was expected that Mr. C. E. Scribner would read the paper of the evening, but, because of his absence, Mr. C. A. Brown, of the Western Electric Company, read a carefully prepared paper on the "Revision of the Patent Law," apropos of the agitation of this subject which is now bubbling up in the National Electric Light Association.

Mr. Brown's main points in support of his position of antagonism to the proposed attempt to secure a revision of the patent laws are plain, and the club generally—unanimously, indeed—endorsed them. These are:

1. The risk of possible ignorance and inimical opinions on the part of the commission.

2. The time is inopportune. So much ill feeling has been engendered, and hostility promoted, by the drive-well and barb wire patent cases. Mr. Brown might have mentioned the telephone patents, which are probably still more to the point.

3. The near approach of a general election might render it difficult to obtain an impartial consideration of the question.

4. The questionable policy of attempting the reform by an indirect route, rather than appealing direct to Congress in the premises.

5. The possibility of very generally widespread ignorance as to what is wanted, and

6. The want of proper support among patent attorneys and experts, who are opposed to any such move.

Having no copy of Mr. Brown's paper from which to quote, the above are given from memory, and are, I think, pretty nearly correct.

There are other points which might be added. The attempt of a comparatively small number of inventors and owners of patents—compared with the whole number of callings interested—is almost sure to either fail utterly, or if of a sufficiently weighty character to warrant the effort, might just now drift into politics, and then God help the inventor, and the devil take the purchaser.

Carlyle once said of the British government that "it is remarkable how long a rotten fabric will hang together, provided it is not shaken."

The present law may be, probably is, faulty. The honorable gentlemen from Pawkeag and Shinnytown will, just at this time, if the matter gets to their ears,

"Sing a song o' boodle,
Shovel out the tin,
Money for amendments,
Promise is too thin.
When the bill's before us,
T'other side we'll spot;
He who anties last, boys,
Carries off the pot."

Seriously, it seems to a fellow up a tree as if the best policy is not to go off half bent, or before there is a better and more thorough understanding among electrical people, and some prospect of co-operation on the part of other heavy classes of patentees. Better wait and win, than fire and miss the game."

During the discussion which followed, Mr. Haskins was called to the chair to allow Mr. Brown an opportunity to participate.

Mr. George P. Barton was called by the chair and made quite extended remarks in support of Mr. Brown's paper. He was followed by Messrs. Andrews (Edison), Kempf (Brush), Shain (U. S.), Haskins, Horne and others. The meeting was an extremely interesting one.

G. S. Bowen, of the National Electric Light Association, says that he has made arrangements for a one and one-third rate from all Western and Northwestern points to the Pittsburgh meeting and return. A special car or cars will leave Chicago on Monday P. M., February 20th, for the accommodation of delegates. Any further information may be obtained by addressing Mr. G. S. Bowen, Elgin, Ill. Chicago delegates will be carried for $12 and returned at $4--a total of $16. C. C. H.

Chicago, Jan. 20, 1888.

OUR KANSAS CITY LETTER.

(From a Special Correspondent of the ELECTRICAL REVIEW.)

The annual meeting of the stockholders of the Kansas City Electric Light Company, was held this week and the following directors were elected: W.B. Gaines, J. H. North, O. D. Dean, E. R. Weeks, F. H. Hoover, J. S. Chick, W. W. Kendall, James Scammon and A. R. Barnhardt.

A company is being organized in Springfield, Mo., for the establishment of an electric motor line.

At the first annual meeting of the St. Joseph Electric Club, held in that city last week, the following officers were elected for the ensuing year. W. C. Stewart, president; G. M. Hohl, first vice-president; Joe Henson second vice-president; H. W. Taylor, secretary; J. M. Austin, treasurer; board of managers: J. T. Dyer, E. J. Eckel, W. M. Yeuawine, Fred. C. Parker, C. R. Berry; committee on membership: W. R. Robinson, Dr Charles O'Farrel, J. H. Parker, Theo. Steinacker, Chris. L. Rutt.

Liberty, Missouri, now appreciates her electric light system. A part of the dynamo of the electric light plant was broken last week, and the town was left in darkness for several nights.

The Independence, Mo., Electric Light Co., has put an arc electric light on the top of the Court House tower in that city. It is 150 feet above ground, and the site of the Court House is one of the highest points in the State.

The Missouri and Kansas Telephone Company is arranging to connect Emporia and Topeka, Kas., by telephone in the spring.

The city council of Wichita, Kas., has imposed a license tax of $1,000 annually, on the Missouri and Kansas Telephone Company. Against this the company has strongly protested. At the last meeting of the council, Mr. Chas. S. Gleed, of Topeka, Kas., the attorney of the company, was present, and addressed the council on the subject of repealing the ordinance. His main argument was that the city had no right to tax the company after having given them the absolute right to operate in the city without taxation. He said, moreover, that it showed base ingratitude on the part of the city, for which the company had put in an expensive fire alarm system. Mr. Gleed said that the company's plant in Wichita, was worth but $20,000, and that since the company had been in operation there, a period of two years and seven months, the total receipts had been only $4,680.80, while the total expenditures had been $4 219.37, leaving a surplus of a little over $400. Mr. Gleed's eloquence prevailed, and the ordinance was referred to the license committee for further investigation.

G. M.

KANSAS CITY, Mo, Jan. 17, 1888.

OUR BOSTON LETTER.

(From a special correspondent of the ELECTRICAL REVIEW.)

There are petitions before the Massachusetts legislature for elevated railways in Boston on the Meigs, Mayall, Riley and other systems. Hearings have been granted as follows:

Feb. 1 for hearing the petition for an amendment to the charter of the Meigs Elevated Railway Company; the 16th, for the petition of Thomas J. Mayall and others for an elevated railroad charter, and the 28th for the petition of F. A. Bartholomew and others for a similar purpose.

Chairman Purroy and Richard Croker, of the New York Board of Fire Commissioners, and Supt. Smith, of the fire alarm department, were in this city on Friday inspecting the Wardwell system of fire alarms.

It is reported that a syndicate has bought all the rights of the Van Depoele systems of electricity, and that the works which are now in Chicago will be removed shortly to Birmingham, Conn.

The New England Wiring and Construction Co. is installing about 200 lights at the Albion Paper Co.'s works at Holyoke. The Edison lights are being put in all through the first floor of Young'sHotel by the same company, who are also increasing a plant at Skowhegan, Me., by about 200 lights.

The Tremont Electric Co. has removed from Mt. Washington Avenue to the large new building at the corner of Congress and A streets, which is being fitted up for this special purpose.

One of the pleasantest and most popular of Boston's new hotels is the Thorndike, on Boylston st. The entire lower floor is being wired for incandescent lighting, Fuller, Holzer & Co., doing the work. Electrical men visiting Boston will find the Thorndike very convenient to the Electric Club rooms, a few doors below.

The Tremont st. stores have so generally adopted electric illumination that those lighted by gas are almost conspicuous by their dimness.

Among the 1,000 employes at the Thomson-Houston factories at Lynn, Mass., there exists a mutual benefit association which has paid out over $500, during the past three months. It is a significant fact during these times of strikes and lock-outs, and one that speaks volumes for the justice and wisdom of the management, that no labor troubles have ever occurred among the Thomson-Houston employes.

Mr. S. A. Barton, the Western Manager of the Thomson-Houston Electric Co., has been in town several days. Mr. Barton says the business of his department in the West is very large, the demand for electricity as an illuminator being, as in the East, very great.

T. W. S.

Boston, January 23, 1888.

Getting Ready for the Electric Club Opening.

The various committees of the Electric Club have been busily engaged for the past week or so in getting all details completed in readiness for the formal opening of the Electric Club's new club house next Tuesday evening, January 31st.

The Reception Committee on that night will be provided with badges, and will endeavor to see that all who attend become acquainted. This committee is composed of the following members: Geo. Worthington, Geo. M. Phelps, jr., M. T. Davidson, L. E. Curtis, H. R. Garden. W. S. Hine, F. R. Hastings, Frank G. Stone, Lieut. F. W. Toppan, U. S. N., H. L. Storke, Jno. B. Powell, Geo. L. Beetle, Geo. F. Porter, W. L. Candee, H. D. Stanley, C H. Barney.

A doorkeeper will be stationed at the entrance, and the admission cards will be taken up as each guest enters.

The Entertainment Committee, of which Mr. J. C. Tomlinson is chairman, has had charge of the programme for the opening. It will consist of remarks by the president of the Club, formally opening the new house, the reading of letters and telegrams by the chairman of the committee, Prof. Rowland's address, and brief concluding remarks.

The supper room on the second floor will be open from 8 o'clock on and will be in charge of the steward of the club.

Hon. Chas. S. Gleed, attorney of the Missouri and Kansas Telephone Co., is visiting in this city, hobnobbing with other eminent electro-legal lights.

Public Lighting by Municipalities.

BY FRED H. WHIPPLE.

Written for the ELECTRICAL REVIEW.

The entrance of municipalities into the field of electric lighting is not a new element of competition, yet it has thus far been almost exclusively confined to smaller places, requiring comparatively smaller plants and a lesser outlay. It is only within the past few months that any active steps have been taken by the large cities looking towards the ultimate ownership and control of their public lighting, to be operated in about the same manner as their water systems. The greed of private corporations is largely responsible for the growing sentiment in favor of cheaper lighting The experience gained by the initial years of the dynamo has not in all cases been heeded by the companies, and the reduction of price has not kept pace with the improvements calculated to diminish the cost. Expiring contracts have been renewed usually without this consideration, until the "light of the future" has become a familiar quantity, and the eye of the public economist has been turned toward its production at the least possible cost. The benefit of a reduced cost of production has been given to the purchaser so sparingly that it has engendered an appetite to know more of the article being bought. The results obtained by the towns which purchased and maintain their own plants have opened the eyes of their more liberally populated sisters, and so great has been the demand for information, and so liberally has the demand been filled that there is not an important city in the country, in which public electric lights are used on the streets, but has a department wholly or partially engaged in investigating electric lighting, and it is the opinion of many of those best qualified to speak, that the near future will see all of the large cities purchasing and operating their own plants. Chicago must, by reason of her financial laws, proceed piecemeal, but she is proceeding surely. Philadelphia has taken the initial steps, and Detroit and Minneapolis have official committees at work, gathering the necessary knowledge.

The principal cities of the country are now paying for their public lighting, prices as shown below. For all night lighting. every night in the year, Savannah and Nashville stand at the head of the class, paying 70 cents per night, or $255 per light per year. Then comes Boston and Washington at $237.25; Montgomery, Ala., Springfield, Mass., and Montreal, $219; Fall River, Mass.; $204; Cambridge, Mass., Philadelphia, Worcester, Mass., Kansas City and Toronto, $200; Detroit, $188 70; Albany, N. Y., Newark, N. J., Baltimore, Bridgeport, Ct., Holyoke, Mass., New Haven Ct., Providence, R. I., Trenton, N. J. and Hartford, Ct., $182.50; Memphis, $180; Buffalo, $174.38; Schenectady, N. Y., $171.55; Salem, Mass., $168; Dayton, Ohio, and Bangor, Maine, $150; Erie, Pa., and Richmond, Va., $146; Syracuse, N. Y., Atlanta, Ga., and Wilkesbarre, Pa., $144; Springfield, Ohio, $130; Lancaster, Pa, $127.75; Poughkeepsie, N. Y., $127.50; Oswego, $126.83; New Orleans, $125; Chattanooga, $121.66; Newburg, N. Y., $120; London, Canada, $116.80; Rochester, $104.30; Jackson, Mich., $98.55; Harrisburg, Pa., $93 20; Ottowa, Canada, $80; and Racine, Wis., $70.

Here is a wide variance in price, and when the knowledge reaches the proper authorities it naturally raises the query: Does the cost of production vary as proportionately? No electric light company will scarcely venture the assertion that in the list of cities above, where the considerations are equal, it does. There is but one solution to the problem—either the higher priced companies are making tremendous profits, or the lower ones are furnishing light for nothing.

Allentown, Pa., pays $100 per lamp per year, burning on all but bright moonlight nights. For the same service Peoria, Ill., pays $145; Petersburg, Va., $96; Paterson, N. J., $98.25; Reading, Pa., $164.25; Council Bluffs, Ia., $240; Lafayette, Ind., $50.60; Galveston, Texas, 75 cents per night; Logansport, Ind., $115; New Bedford, Mass., 50 cents per night; Quincy, Ill., $120; Mobile, Ala., $90; Bloomington, Ill., $108; Sacramento, Cal., $252; Sandusky, Ohio, $82.50; Terre-Haute, Ind., $88.33; Davenport, Ia., $145 for poles and $190 for towers.

South Bend, Ind., pays $100 per year per light every night until 12 o'clock. So do Brazil, Ind., and Clarkesville, Tenn. For 1 o'clock lighting, Lynn, Mass., pays 47½ cents per light per night; Waterbury, Conn., 33⅓ cents; Somerville, Mass., 37 cents; Akron, Ohio, pays $3\frac{8}{10}$ cents per hour up to 2 o'clock; Joliet, Ill., pays 23 cents per night for similar lighting, and Youngstown, Ohio, $64 per year. Saginaw, Mich., pays $100 per year for light up to 3 o'clock; Ft. Wayne, Ind., $135 per light whenever needed, and Toldo, Ohio, lighting all night, for 300 nights, pays 55 cents per night on one contract, which is $200 per year, and $40 per year on another contract. How much profit is there at $200? and how much loss, if any, at $40?

Denver pays $28 per year for incandescent street lights, moonlight schedule, and $10,260 for seven towers. Stillwater, Minn., pays $23 per incandescent lamp, and Oskaloosa, Ia., pays $18; Cleveland, Ohio, pays 10½ cents per hour for 4,000 candle power lights on masts, and $3\frac{7}{10}$ cents per hour for intersection lights. New York has 831 public electric lamps for which she pays 24 cents, 25 cents, 39 cents, 40 cents, 50 cents and 60 cents, according to the several contracts. A proposition has been made to furnish Topeka, Kas., with eight towers of four lamps each for $8,000 per year. Portland, Maine, pays $140 per year for all-night arc lights of 1,200 candle power, and $18.00 per annum for 32 candle power incandescents. Utica, N. Y., has entered into a contract to be lighted throughout for $42,000 per year. San Francisco pays $5.28 per night for lights of 16,000 candle power each, and 66 cents per night for 2,000 candle power light. Pittsburgh lights her wharf for $185 per light per year; Milwaukee has just contracted for a small number of lights at $150 each; Des Moines, Ia., has six lights at $120 each; Omaha twelve for $180 for 12 o'clock lighting, and $216 for all night; Elmira, N. Y., pays an average of $188.50 for three lights; Altoona, Pa., has thirteen 32 candle power incandescents for $26 each per annum.

Bay City, Mich., operates its own plant. The cost is $42 per light per year, running until 10 o'clock. Lewiston, Maine, manufactures its light for 14 cents per night, or $51.10 per year. Michigan City, Ind., maintains a 50-light plant for $2,000 per year, or $20 per lamp; and City Electrician Barrett, of Chicago, estimates that its river plant will cost but $50 per lamp per year. Madison, Ind., operates its plant for $55 per light per year. Responsible electric manufacturing companies have guaranteed Detroit that if it should purchase and maintain a plant, the cost of maintenance shall not exceed $80 per lamp per year, burning all night and every night. The Detroit council has set a committee at work thoroughly investigating the question of public lighting. Specifications for a complete plant of the capacity of 1,000 lights have been placed in the hands of every manufacturer of electric light material, and when the committee is ready to report, which will be in a short time, there will be a presentation of facts and figures that will be of interest to every city and town that believes it is paying too much for its public light.

So much of this article as relates to figures is taken from the forthcoming report, and is authentic. It is the first compilation of such statistics that has been undertaken by municipalities in the United States.

An Electric Organ.

A new organ, called an orgue electrique, has been placed in the Church of Sainte Clotilde in the Faubourg Saint-Germain. It is the first instrument of the kind which has appeared in a Paris church. The accumulators are placed behind the high altar, whence the wires are connected with the keyboards and the organ pipes.

Telephonic News

*** The electric railway at Binghamton, N. Y., is to be extended and the power plant enlarged.

*** The city council of Elkhart, Ind., has granted a franchise to the Cushman Telephone Company, of Chicago. There were no provisions as to when the service would begin.

*** The telephone wires of Buffalo are said to be slowly but surely disappearing into the creosoted wood conduits of that city. The telegraph wires are expected to go into the same conduits.

*** The telephone is changing the American voice and the American ear. Every man has a telephone ear as well as a telephone voice. It is generally the left ear. The voice is occasionally left.

*** The Boston line of the American Telephone and Telegraph Company is proving a great success. Four lines have already been leased, and some eight more are being asked for. The long-distance service now extends between New York, Philadelphia, Albany and Boston, and the New England lines include a number of important cities, such as Ansonia, Waterbury, Stamford, Bridgeport, Hartford, Springfield, etc. A great many New York houses use the lines daily to talk with their factories.

*** The old land line of the Government telegraphic and telephone service, connecting the Block Island shore end of the cable with the telegraph office and the south lighthouse, was sold to the Bell Telephone Company for about $600 last fall, but has not yet been removed. There should be a telephone line connecting the two life-saving stations. It would be a great convenience, and might be the means at some time of saving the few precious minutes required for the rescue of human life.—*Prov. Journal.*

*** Recently, at New Orleans, several young ladies, the chief operator and general manager of the telephone exchange visited the Louisiana brewery, upon which occasion Miss Williams, the attentive operator of their line, was presented with a handsome gold watch and chain by Mr. Engelhart, on behalf of the company, with many compliments. Miss Williams thanked him, after which the party was conducted through the immense building. Upon reaching the ground floor they were again surprised by a repast in the directors' room, which all enjoyed. Toasts were proposed by Mr. Diehlman, president of the brewery, and Mr. Fowler, general manager of the Telephone Company.

*** Right of Way Agent Meaney met with more than the usual number of interesting adventures in securing a pathway for the poles of the Long-Distance Telephone Company. One New England farmer was finally mollified by the sale of some trees that stood in the way, and upon cutting them down the company presented them to him. The local pastor coming along expressed great indignation over the inroads the telephone company was making, causing the destruction of the forests, etc., and concluded his harangue by telling Mr. Meaney that the country had got along very well without the telephone and could continue to do so "Yes," replied the imperturbable Meaney, "but did it ever occur to you as a preacher, that this country got along some four thousand years without Jesus Christ, yet he finally came." The minister drove on. More recently an angry woman came out with a very old and rusty axe to chop Meaney in two if he didn't have the men come down off the poles and take them away. "My dear woman, won't you please have pity on me and get a bright axe," replied Meaney. The men all laughed, the woman followed suit, and the work went on undisturbed.

The Chicago Telephone Co.

Corporation Counsel Green, of Chicago, thinks that the Chicago Telephone Company is operating without any franchise from the city or without any rights in its streets whatever. The Chicago Telephone Company purports to derive its franchise from the Union Telephone Company, which obtained its rights from the Bell Company of Illinois, which, in turn, obtained its franchise from the American Bell Telephone Company. The law department is certain the franchise could not be transferred, and states there is only one avenue of escape for the company, and that is based on the claim that the American Bell Company owns the majority of the stock of the Chicago Telephone Company. But the city holds that there is nothing in law which makes the question of the ownership of the stock cut the slightest figure in the case. They were all corporations, and as such the stock might have been held by any one.

The Telephone on the Alps.

Telephonic apparatus has been installed with great success in the famous Hospice of the Great St. Bernard. We may accordingly expect one of these days to see the regions of thick-ribbed ice gleaming under electric beams, as we may already see Bengal lights thrown on the cascades and glaciers of the great Alps The occupations of the mastiffs who hunt up lost travelers will be gone, and the cowl-clad canon who acts as the benevolent and affable prior of the monastery will be replaced by a ruddy and rubicund Boniface, to whom tourists will telephone for beds. The installation of the telephone amid the sempiternal snows suggests many more peculiar possibilities, but for the present the instrument will be used for a definite and very laudable purpose. The facts of the case are these: Canon Bourgeois, Prior of the Great St. Bernard, took it into his learned head about twelve months ago, that, if telephone offices were organized at St. Remy, in the monastery itself, and at Proz en Valais, the number of fatal accidents annually happening among French and Italian workmen while crossing the mountains between October and May might be diminished. He communicated the idea to Canon Bérard, of Aosta, who took up the matter with energy. M. Bourgeois had invented a telephonic apparatus of his own, and after a while the Swiss and Italian Governments gave their respective sanctions to the proposed plans. The Prior was duly authorized to join his telephone to the telegraph wire between Aosta and Martigny. Since then telephones have been in operation at La Thuile, in the Hospice of the Little St. Bernard, and in several of the adjacent cantons. Last Sunday the Canon had a kind of field day with his telephones, and, making the Little St. Bernard his temporary headquarters, he conversed with the brother in charge of the office in the Hospice of the Great St. Bernard, and with the officials in the various cantons.

Austrian Telephone Statistics.

Because in Austria there are about 3,000 subscribers only to telephone exchanges it is constantly said that Austria is behind other States in this respect. Of the 3,000 about 1,000 are in Vienna. It is a question if there could not be more there, but as business is very bad in Austria, especially in Vienna, it certainly does not seem likely. Why are there not more in Austria? is the question, and the answer is simply because there are so very few towns of any size, and still fewer commercial or manufacturing towns; and where there are no towns telephone exchanges are not wanted. Austria is an agricultural country, and cannot be called a manufacturing or trading country. On the other hand, those towns which are commercial have already telephone exchanges, and in them the number of subscribers will compare very favorably with those of any other towns of similar size in Europe; and the charges still more so, whilst the service is known to be excellent. The following table will prove that most of the towns outside Vienna are well supplied with telephones, especially in proportion to the number of inhabitants:

Prag.....	200,000	inhabitants,	516 subscribers.
Trieste.....	120,000	"	427 "
Lemberg....	100,000	"	226 "
Graz.....	98,000	"	222 "
Czernowitz..	45,000	"	101 "
Pilsen.....	38,000	"	111 "
Reichenberg	28,000	"	232 "
Bielitz.....	13,000	"	137 "
Linz	41,000	"	130 "
Brunn.....	83,000	"	250 "

The first eight of these are worked by the Telephone Company of Austria. The charges vary, according to the size of the town, from £5 to £7—a very low charge. Out of these only Prag, Trieste, Reichenberg and Bielitz can be called commercial or manufacturing towns, to which Brunn must also be added. No doubt there is further room for increase, and the Austrian Government have wisely decided to open exchanges in the remaining towns, and it is understood that at the beginning of next year exchanges are to be started in Krakan, Salzburg, Innsbruck, Marburg, Moran, Wiener Neustadt, Baden Gablen, Karsibad, Teplitz, Troppan, Laizbach, Gorz, and others.—*London Electrician.*

Effect of the Vibration of Telegraph Wires on Wild Animals.

Some interesting facts have been brought out in a paper by M. C. Nielsen, of Christiana, on the impression produced upon animals by the resonance of the vibration of telegraph wires. It is found that the black and green woodpeckers, for example, which hunt for insects in the bark and in the heart of decaying trees, often peck inside the circular hole made transversely through telegraph posts, generally near the top. The phenomenon is attributed to the resonance produced in the post by the vibration of the wire, which the bird mistakes as the result of the operation of worms and insects in the interior of the post. Every one knows the fondness of bears for honey. It has been noticed that in mountainous districts they seem to mistake the vibratory sound of the telegraph wires for the grateful humming of bees, and rushing to the post, look about for the hive. Not finding it on the post, they scatter the stones at its base which help to support it, and, disappointed in their search, give the post a parting pat with their paw, thus showing their determination at least to kill any bees that might be about it. Indisputable traces of bears about prostrate posts and scattered stones prove that this really happens. With regard to wolves, again, M. Nielsen states that when a vote was asked at the time for the first great telegraph lines, a member of the Storthing said that although his district had no direct interest in the line proposed, he would give his vote in its favor, because he knew the lines would drive the wolves from the districts through which they passed. It is well known that to keep off the ravages of hungry wolves in winter the farmers in Norway set up poles connected together by a line or rope, under which the wolves would not dare to pass. "And it is a fact," M. Neilsen states, "that when, twenty or more years ago, telegraph lines were carried over the mountains and along the valleys, the wolves totally disappeared, and a specimen is now a rarity." Whether the two circumstances are casually connected, M. Neilsen does not venture to say.

Telephone Wires Underground.

At the dinner of the Merchants' Club at Boston, last week, Prof. Jacques, of the American Bell Telephone Company, made some interesting remarks in regard to putting telephone wires underground. He said that "had the much-discussed question of whether telephone wires could not just as well be laid underground been asked ten years ago, we would have had to say no, because at that time it was found that if two telephone wires were run close together, everything that was said on one wire was overheard on the other wires in the immediate neighborhood. That, however, has, to a considerable extent, been done away with. And the best answer to the question is that now telephone wires are, to a very large extent in our large cities, underground. Statistics for the last year show the length of wires underground at 6,000 miles, against only 10,000 miles on housetops. The question now simply becomes one of expense. Where there is a large number of wires, they are carried underneath the streets of our cities. But it is manifestly impossible, simply on economical grounds, to suppose that every individual wire starting out from a central office and going to some thinly settled part of the city should be laid underground the entire distance in a pipe by itself."

The Heavy Load of Iron did not Affect the Induction Telegraph.

There left Perth Amboy, at 12.30 P. M., Friday, January 13, on the Lehigh Valley Railroad, a special train consisting of engine No. 15 and eight flat cars loaded with very heavy iron and steel castings which had just arrived from Europe on the steamship Colorado, of the Wilson Line, and consigned to the Bethlehem Iron Company. They were the heaviest carloads ever hauled over this road. One flat car was loaded with two shafts, each weighing eighteen tons gross. This car was built at Packerton shops especially for this purpose, and has a capacity of 100,000 pounds. Two other flat cars were loaded each with a single casting weighing twenty-seven tons gross apiece. Superintendent J. Donnelly and train dispatcher G. Broadhead were on board, and the caboose was provided with a telegraph office. The induction worked perfectly throughout the entire trip, in spite of the presence of that enormous amount of iron. The officials were in constant communication with their offices, and the following important messages were exchanged:

PERTH AMBOY, N. J., Jan. 13, 1888.
12 54 P. M.

To G. B., on Engine 15—
288 ft. has some work to do at South Plainfield. If you want to go around them, can back them over there.
[Signed.] W. W. B.

Dated Engine 15, Jan. 13, 1888.
12 56 P. M.

To W. W. B, P. A.—
288 ft. has not left P. J. yet.
[Signed.] G B.

Dated Engine 15, Jan. 13, 1888.
1.04 P. M.

To W. W. B, P. A.—
288 ft. is in P. J. yard with two drawheads pulled out. We have gone around them.
[Signed.] J. D.

Dated Engine 15, Jan. 13, 1888.
1.47 P. M.

To W. W. B., P. A.—
Please find out from Easton if they want this crew and engine to go through to Bethlehem or not, and answer.
[Signed.] G. B.

Dated Easton, Pa., Jan. 13, 1888.
Rec'd 1.51 P. M.

To G. B., on Engine 15 —
Can Engine 15 and crew take the irregular train through to Bethlehem ?
[Signed.] N. A. F.

Dated Engine 15, Jan. 13, 1888.
1.53 P. M.

To N. A. F., at Q.—
Yes, sir.
[Signed.] G. B.

Dated Engine 15, Jan. 13, 1888.
2.17 P. M.

To W. W. B., P. A.—
We are going to stop at Flax Mills to cool off hot boxes on large L V car, which is only car that has hot boxes.
[Signed.] G. B.

Dated Engine 15, Jan. 13, 1388.
2.37 P. M.

To W. W. B., P. A.—
288 ft. cannot get in at Flax Mills for No. 6.
[Signed.] G. B.

Dated Engine 15, Jan. 13, 1888.
4.14 P. M.

To W. W. B., P. A.—
Have stopped about one mile west of B. Y. to cool off hot boxes.
[Signed.] G. B.

Several other official messages were exchanged, not relating to the movement of the train. The special train arrived in Easton about 4.30 P. M.

—— The city council of Macon, Ga., have been wise in their day and generation, and soon expect to see the Thomson-Houston electric light system installed in their city.

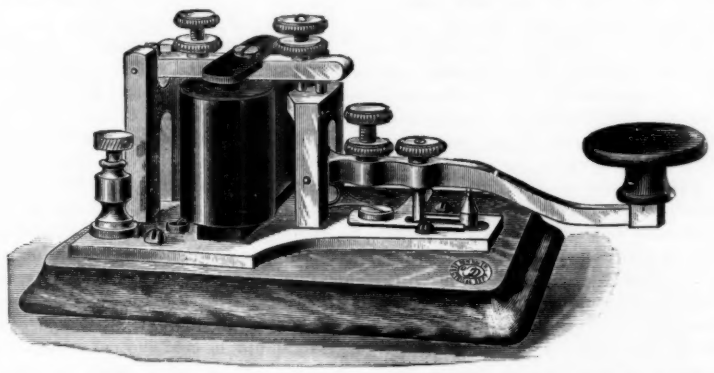
Practical Telegraphy.

Stenography has been justly designated the "coveted art," and I do not see why telegraphy should not claim a place of similar distinction. Several treatises have from time to time been devoted to the study of scientific telegraphy, and although the authors of those compilations have taken considerable pains to unravel the mysterious truths of electricity, their efforts to illustrate the intricacies of this important science have not, however, been rewarded with that degree of success that their painstaking exertions so deservedly merit. To men possessed of a sound knowledge of practical telegraphy those handbooks impart a vast amount of useful scientific information which technical experience and mature discernment qualify readers of this class to thoroughly understand; while, to the neophyte, whose ideas of magnetical properties and electrical causes and effects are not particularly definite, the study, instead of proving profitable, is more calculated to involve him in perplexity. The absence of any work having for its object the tuition of the art itself, shows that this acquirement has been looked upon as an attainment that may be intuitively mastered, unassisted by the guidance of no better an instructor than a Morse code card. Such, however, is not the case. The study of telegraphy is a far more laborious and important application than is generally supposed, and so much depends upon the subsequent prospects of the telegraphist from his elementary training, that the greatest care should be taken to strike out a recommendable method of signaling for the learner, and to impress upon him the necessity for adhering to that system, as nothing is more fatal to his success in gaining the reputation of a qualified telegraphist than to habituate himself to the practice of varying his style of "sending" by trying to imitate that of another operator, an error unfortunately very common among learners. Fully sensible of my own incompetency to undertake the arduous task of establishing any specific manipulatory standard, my object is merely to express my personal views on a subject which I am convinced has been sadly neglected, and one in which I take an especial interest. If my suggestions do not, therefore, meet with the approval of the better-instructed members of the fraternity, I shall, however, feel that my attempts at endeavoring to revise certain remediable imperfections in this branch of telegraphy have been devoted, however unsuccessfully, to a laudable object. It would, of course, be preposterous to lay down any fixed method for holding the key of a sounder instrument, but as custom is more in favor of the practice of placing the two first fingers on the key, letting the thumb merely touch it on the left-hand side, it would, perhaps, be well that this form were more generally adopted.

By slightly uplifting the hand from the key, after the completion of each letter, and allowing it to descend with gentle pressure on the apparatus, when the allowed limit of space between the letters has expired, a clearer and livelier tone is, I think, lent to the signals at the receiving station than could be produced by continuously resting the hand on the key. In forming the dash, a pause equal to the length of time it would take to form the letter "S" should be made, a third of this time being sufficient to form the dot, or perhaps to be more explicit, the dot is formed by simply touching the key, letting it spring back again immediately. An equal amount of uniformity should be observed in the formation of each character, by making the dots and dashes of even length throughout. A system of signaling is largely pursued, particularly at railway offices, the damaging effects of which are noticeable by the total want of regularity observed in the formation of letters entirely constituted of dots, such as the letters "H" and "S." The telegraphist, instead of making each dot of the same length, by this mode of sending, dwells much longer on the three first dots than he does on the last one, giving the letter more the appearance of three short dashes and one dot than one of four dots, with the frequent result that the final dot fails to reach the receiving clerk at all, who is thus obliged to rely on his own discretion for the accuracy of the word intended to be signaled. The same inconsistency is perceptible in the composition of the letters "B," "D," "I," "L," "Z." This imperfection may be amended, by carefully signaling the letters referred to and by giving the terminating dot a due amount of pressure. Another defect, and one equally as important, often occurs in the formation of letters ending with a dash, when the final dash is hurriedly formed, thereby destroying the construction of the letter. When a clerk has not the advantage of testing his sending on a Wheatstone slip those faults are not so visible to himself as they are to the receiving operator, to whom they manifest themselves with painful distinctness. This form of sending which I have essayed to describe is productive of the most pernicious results, and several of the errors which are daily occurring in the transmission of telegrams are more or less traceable to this species of faulty manipulation. It also gives the receiving telegraphist an inordinate amount of trouble, debars the sender himself (in the event of his being required to do so) the option of sending on a slip-recording instrument, and excites the ridicule of his more efficient brother-workers against him. It should, therefore, become the diligent labor and ambition of every operator, whose working is characterized by blemishes of this kind, to immediately endeavor to repair these serious imperfections, and aspire to score a point in the foremost ranks of that invaluable body of public servants, the telegraphists of Great Britain and Ireland.—*The Telegraphist.*

A New Telegraph Set for Beginners.

The "Unique" is the name of a new learners' set, that is very simple and easy to manufacture. It is owned by the New Haven Clock Company, who sell it as cheap as the ordinary cast-iron sets can be purchased for, yet it is equal to the regular Morse set in point of finish. One of the advantages of the sounder is, that the lever is so made that the armatures are prevented from moving off the cores, by means of an upright post, which acts as the adjusting post and at the same time holds the lever in place. The key is made in the same way, and if it should become loose at the trunnions, the contact points would remain one on the other. The key is arranged with a new style of switch, which makes a good sliding contact. The set takes up only the space of a sounder, both key and sounder being mounted on an ordinary sounder base.



THE NEW HAVEN CLOCK COMPANY'S NEW STYLE TELEGRAPH SET FOR BEGINNERS.

Telegraphy an Amusement.

Some young women in this city, with time and money to spend, have studied telegraphy, and in some instances their homes are connected by telegraph wires, over which the young women receive messages, says the *Mail and Express.* It takes a long time to become efficient as an operator, but some of these fair students have worked so industriously that they can both receive and transmit messages as quickly as some who earn their livelihood at the key. The cost of having wires fitted up and connecting batteries, transmitters and keys is not great. The following shows how much it will cost to have a wire placed between two houses about 600 feet apart:

Insulated wire	$ 5.00
Two combination sets—sounder, lever, key and transmitter—$13 each	26.00
Two batteries, including zinc, copper bolts, etc., $1.50 each	3.00
Binding posts, connectors	5.00
Total	$39.00

This outfit will connect two houses. If there are more friends who wish to come into the circuit the expense will be increased. It will then be necessary to have switchboards. These cost $5 each for three lines and $2 extra for each additional line. Of course every one in the circuit must have a receiver and battery. These cost $14.50 for each one. Enough wire to extend the length of a block costs $2.50. If the circuit is a long one the expense of employing linemen to erect lines will be considerable. Four friends can have wires run to their houses at a cost of about $100. The instruments are similar to those used by the telegraph companies all over the country, and they require a great deal of study to be able to send messages and to receive them. Two or three months' study is sufficient for any one who merely wishes to send messages for amusement.

A Milk Thief Caught by Electricity.

One of the members of the police force of Boston is an electrician, and when off duty is constantly experimenting with captive lightning. He has his residence at the South end wired from attic to cellar, and makes the electric fluid do all that it is capable of therein. For the last few days his milk has been stolen, can and all. He made up his mind that the thief must be captured, and called to his aid his favorite electrical appliances. The milkman had been in the habit of leaving the lacteal fluid on a little shelf beside the rear door of the house. In order to reach this door, it was necessary to pass by the front entrance and go down an alleyway some fifty feet long. Mr. Electrician went to work and connected his wires with the shelf, so arranging the circuit, that the removal of the can from its receptacle would strike a gong in the dining room. Yesterday morning he went home early and took up his position under the gong. Soon he heard the milkman stop and leave the can in its place. He waited patiently for further developments, and just as he was dropping into a doze, zip! whir-r-r! went the gong over his head. To spring from his chair and dart for the front door was but the work of a second, and he landed on the sidewalk at the alleyway entrance in season to nab the marauder, who was coming out with the can in his grasp. He did not take him into custody, but it is fair to assume that there was not dust enough left in the fellow's coat to cause irritation in a midget's optic. The fellow will probably not attempt to purloin that officer's milk for some time to come.

The Philadelphia Idea.

Speaking with a young lady, a gentleman mentioned that he had failed to keep abreast of the scientific advance of the age. "For instance," he said, "I don't know at all how the incandescent electric light which is now used in some buildings and railway cars is procured."

"Oh, it's very simple," said the lady. "You just turn a button and the light appears at once."—*Philadelphia Telegram.*

TELEGRAPHIC

.... Now while Congress is getting ready to debate propositions to establish a Government telegraph system, involving the expenditure of millions on millions, it is instructive to recall the urgent but futile endeavor that Morse made to sell out his entire claims and profits for $100,000.

.... The Western Union Telegraph Company has a stock capital of over $85,000,000, with over 16,000 offices, out of which last year over 47,000 000 messages were sent spinning, to earn a revenue of $17,000,000, this one company having in 11 years paid dividends of more than $18,000,000 in cash.

.... The first corporation in the country to extend any courtesies to the telegraph in its early days was the Baltimore and Ohio Railroad Company, its directors voting that Prof. Morse might have right of way "for development" along their tracks to Baltimore from Washington, "providing that nothing be done to interfere with the operation of the railroad."

.... There has been more or less talk about a line across the Pacific, but so far nothing definite has been done. A project is on foot in California to induce the General Government to lay a cable to the Sandwich Islands as a necessary condition for providing for the defense of the western coast of the Union. It is held that the United States must sooner or later, acquire those islands, and then telegraphic communication would become necessary; but there would not be for a long period enough private business to support such a line, and the government would have to take it in hand as a public necessity. The air-line distance from San Francisco would be about 2,000 miles, with an enormous depth of water, reaching from four to five miles in places. Honolulu is only about one-fourth of the distance across the ocean to the Chinese coast, so that under any circumstances, even if the United States should undertake to lay a cable to the Hawaiian archipelago, which is not likely, now at least, that would be but a little way toward a cable across the Pacific Ocean.

... Mr. William A. Hovey, well known in telephone circles, is taking a hand in journalism again in his weekly column of "Causerie" in the Boston *Herald*, the revival of a feature which was so popular in the Boston *Transcript* during his administration as editor. In a recent issue of the *Herald* he says:

Causeur has of late seen a good deal and a goodly number of two classes of men—inventors and politicians. And he fell to thinking of the characteristics of each. The inventor studies and thinks and puzzles his brain, until at length of his ingenuity and perseverance is born some device which saves human labor, or time or money, or all three, for they are, in a sense, synonymous terms. He has his reward, of course, but the great good comes to mankind at large. It is he who "makes two ears of corn or two blades of grass to grow upon a spot of ground where only one grew before," and it might well have been him whom the king had in mind when he gave it as his opinion that whoever should accomplish these things "would deserve better of mankind and do more essential service to his country than the whole race of politicians put together."

The average politician—and some that rank above the average—gives one the idea of insincerity, especially the leaders. The followers are often earnest enough, and readily accept what their leaders tell them, and they certainly must wonder sometimes when they see how the zeal of their superior officers for the public welfare cools off after election. A case in point. Many years ago anti-masonry was a lively political issue in New York, and the Delavan at Albany was the gathering place for the anti-masonic clans, full of zeal for the cause. A member of the Assembly who belonged to the other side came to Albany and took a room at the Delavan. But he found it uncomfortable there—the "antis" were in too big a majority. So he left the hotel and took a room in a boarding house on the hill. It chances that William H Seward was an inmate of the same house, and to him the newcomer confided the fact that the Delavan was full of anti-masons, and by far too hot for him. "But," said Mr. Seward, "I don't see that you have bettered yourself by coming here. I am an anti-mason. In fact, I am one of the leaders of the party." "That's all right," was the answer. "I don't mind you, Mr. Seward, *but they mean it!*"

* * The electric motor railway at San Diego, Cal., was recently tried and worked satisfactorily. The grade is 8½ per cent. The motor, crowded with people, moved up the grade, stopping on the steepest portion, and again starting with ease, and running all day without a hitch. The line is four miles long. The road will be rapidly extended out through the towns of Peralta and La Mesa to El Cajon valley.

* * Electricity on railroads will surely not be long in coming. We are on the eve of greater changes than we have yet seen. In Europe electric lines are a decided success on a small scale. When once the new scheme gets hold of the American system, it will constitute a revolution. Have we any conception of the advance in the smokeless, almost noiseless trains, going at a speed limited only by the danger of destroying the track or flying it altogether? We shall travel at a speed of 100 miles per hour inside the next ten years.—*St. Louis Globe-Democrat.*

* * The Rev. Father Donahue, the Catholic priest at Charleston, Ill., is said to have made a new discovery that is far superior to any that he has yet made. He calls it Latofer Quate, and in effect it resembles the Russian lectover, the most effective explosive known to science. He claims that, if anything, it is superior and more deadly. It is put up in fuses, and is made from pine gum. Mr. Donahue has been appointed a Lieutenant in the French army, on account of his previous discovery, and he has received a gold medal, handsomely engraved, from the Mexican Government, who desire to secure his services. He claims that with his last discovery gunpowder can be made more cheaply, and the new compound will be substituted for it in time.

* * A correspondent of the St. Louis *Globe-Democrat*, at Houston, Texas, says an electrical tinker, by name of S. L. Barrett, was sentenced to the county jail for twenty days for using a pistol in the county court house. While in jail he invented an instrument that he called a micro-detector. While in working position it will warn a jailer if prisoners are attempting to escape, by sawing, filing, or using any other adroit means. It was tested to-day by a number of citizens, they posting themselves in a front room in the back part of the prison, with doors closed. A clock was put in motion. Every click could be distinctly heard in the room. A saw was used gently on the bars, and produced a loud sawing noise. The instrument is worked by electricity on a single wire, the various noises of the cells coming over it distinctly.

* * Walter Harper and Leon Jones, workmen in the employ of the Western Electric Company, were overcome by gas in a manhole of the electrical subway at Sixth avenue and Thirty-second street, Saturday afternoon, last week. J. J. Carty, superintendent of the company's cables in this city, had sent the men to extend one of the telephone cables. Harper was a foreman in the employ of the company, and was fully aware of the danger of going into manholes that were full of gas. He and Jones removed the cover of the manhole before noon and went to work to make the necessary connections. They placed a barrel and a bag piece of canvas near the hole, to prevent the wind from blowing dust on them. After that they were seen to get in and out of the manhole several times.

An Italian vender was passing the manhole shortly before 1 P. M. and he noticed that the canvas had been blown across the opening He lifted the cloth and saw the two workmen insensible in the hole. They were taken out, and physicians worked over the insensible men, but Jones was too far gone to be resuscitated. He died in the street and his body was carried to the West Thirtieth street police station.

Harper was carried to the New York Hospital and soon recovered.

Proposed Use of Electricity for Executions.

"Perhaps the most potent agent for destroying human life," says the N. Y. State Commissioners in their report, "is electricity. Death is instantaneous. The application may be made without injury to officials, the place for its use may be strictly private, and its certainty is beyond doubt.

"One objection to the use of electricity is the shock which people uninstructed in its use suppose is inflicted on the condemned man. As a matter of fact, an electric shock cannot produce a sensation which can be perceptible to the criminal. The velocity of the current is so great that the brain is paralyzed. The man is dead before the nerves can communicate any sense of shock Prof. Helmholz estimates the interval necessary for nerve communication with the brain at one-tenth of a second. Prof. Tyndall estimates that an electric discharge occurs in a one-hundred thousandth of a second, or ten thousand times more rapidly than nerve transmission. Prof. Elihu Thompson, of Lynn, Mass., writing to the Commission, says:

"I should hardly be inclined to favor passing a current through the arms of a metal-armed chair. The subject might not be willing to take hold of the arms. The most certain way to produce death would be to pass the current down the spinal cord from the crown of the head, as by the application of wet surfaces or sponges. No more humane treatment could be desired. In all cases of severe electric shock which have come under my notice, and in which unconsciousness has resulted with recovery, the subject has testified to remembering nothing up to the point of regaining partial consciousness, and no pain was felt."

Thomas A. Edison writes that dynamo-electric machinery which employs intermittent currents would be the most suitable apparatus. The passage of the current from these machines through the body, even by the slightest contact, causes instant death.

The commissioners describe a number of experiments with electricity, as a means of destroying animals, witnessed in Buffalo by one of the Commissioners last year, with Dr. George E. Fell, of that city. Buffalo city, to reduce the number of cur dogs roaming the streets, gave permission to have them dispatched by electricity at the dog pound. A dog was placed in a pine box lined with zinc and partly filled with water. The zinc was connected with one pole of the electric light current, and the other pole was connected with a dog muzzle fitted with an iron or copper bit, like a horse's bit, which was fitted into the dog's mouth. The current was turned on and death was instantaneous. For the purpose of ascertaining the effect of the electric light current on the action of the heart, the thorax of a chloroformed dog was opened so that the lungs and heart could be seen in action, by forcing respiration, as in conscious life. At the instant when the current passed through the heart it became a mass of quivering flesh. The ordinary conditions of dying were absent. It was noticed that an attempt to breathe was made after the current was passed through the dog. This indicated that the brain had not lost its susceptibility to impressions, and shows that in execution the current should be passed through the center of functions in the brain.

Electricity vs. Courtship.

It is said that a genius has invented what is called an electrical lounge. The lounge is connected by wire with the parental bedroom. At 10 15, prompt, the cruel father touches a knob in his room, and the seat of the lounge flies up and spills its occupants upon the floor. We can imagine a youth in the act of proposing when the knob is touched. He is saying:

"Oh, Jennie, I love you more than tongue can tell. Will you be mine? My own, my very own! Will you——"

Just then, presto! change! up flies the seat of the lounge and the pair are sent spinning across the floor. How natural it would be for the young lady to say then:

"Oh, George, this is so sudden!"

Protest Against Electric-lighted Sleighs.

All conservative or reactionary observers who regret some forms of modern progress and look back longingly to past times, will notice with grave disapproval the scheme of certain wealthy and unromantic persons in the city of Newton and Commonwealth of Massachusetts to light sleighs with electricity. What the sleigh needs is not more light, but more heat. The modern sleigh is in no respect an improvement upon its predecessor of centuries ago in point of heating facilities. The foot stove and the hot brick in the sleigh, the generally hot and frequently spirituous refreshment, at places of entertainment on the roadside, are still the main resources of the chilled sleigher. Snow being usually, except in this city, of a white color, the sleigher can usually find his way without difficulty in the night, unless a violent snowstorm is in progress; and when the white wool of heaven is getting pulled, the wealthy gentlemen of Newton don't go sleighing, but sit by their sea-coal fires and doze over our esteemed evening contemporary, the *Boston Transcript.*

The chief objection to sleighing is that, under whatever wrappings and envelopes of fur, it is still essentially a contest with a low thermometer. Wealthy men would do much better to invite and reward scientists to discover some process by which a good sleighing surface will be consonant with a mild and balmy temperature, rather than to stick batteries and six-candle electric lights into their sleighs. The electric light would be about as useful in a sleigh as a thirty-button glove to the Venus of Milo. But it is not from mere considerations of utility that we are unalterably opposed to the introduction of the electric light into sleighs. There are higher, weightier, and invincible reasons against it. The noble firm of the True the Beautiful, and the Good is unanimous against it.

If only themselves were to be considered, there could be no reason why the wealthy men of Newton or any other place known to the gazetteer, shouldn't fly over the snow on their electric-lighted sleighs like frozen fireflies or a string of street lamps on runners. It pleases some men of wealth to be original, even if unwise, in expense. They would put electric light into a sleigh just as they might put in cold and hot water—the latter would be a good thing in sleighs—or a patent endless chain pump or a fire extinguisher. But the faces of the poor must not be ground into the snow by their horses taking fright from electric lights going a mile in three minutes. And, what is more, and most of all, the pleasant sleighing parties of two, He and She the engaged couple and the couple engaged in the fascinating diversion of getting engaged, must not be disturbed and illuminated against their will by the rapid and unexpected striking of these infernal electric flashes. In the name of all the young men and young women who are brought up and who make love in the honest country fashion, in the name of the millions in whose ears the sleigh bells have rung or yet shall ring a marriage chime, we protest against hanging this glaring and vulgar blazing breastpin upon the snowy shirt front of the winter night. The innumerable kind eyes of the sky wink knowingly at the innumerable pairs of lovers sleighing and loving. What in blazes, if we may use a rude but lucent expression, do *they* want of lights of six-candle power?

We advise these wealthy Massachusetts conspirators against a privacy and a privilege dear to millions of their countrywomen and countrymen, to hold back their unwelcome illumination. The electric light is sometimes a convenience, but there are situations which it distinctly does not improve. —*N. Y. Sun.*

[The gallant colonel of New York and Boston, whose experiments in the use of the electric accumulator are thus severely criticised, must not falter in his efforts for the advancement of electric science. The electricity that furnishes light can at the same time, through the medium of the electric heater, keep warm the occupants of the sleigh. Then, should sudden and momentary darkness be desired, how easy to turn a switch or press a push button. All the danger imagined above by our earnest contemporary is thus avoided.]

Electrical Personals.

Dr Otto A. Moses is still absent in Europe. An Electric Light convention without the presence of the versatile Doctor will not seem at all natural.

Mr. Stephen D. Field, who has been ill for a few weeks past, is again himself, and is around, receiving warm greetings from numerous New York friends.

Col. J. A. Corby, president of the St. Joseph (Mo.) Electric Light Company, and a large stockholder in the Pacific Mutual Telegraph Company, is visiting in New York, with his headquarters at the Murray Hill.

Mr. N. T. Pulsifer, general manager of the Mather Electric Company—a company that is rapidly taking a position in the front rank of ably managed electric light companies—came over from Manchester, Conn., last week, to confer with the New York end of the Mather Company.

Mr. C. A. Coffin, vice-president and executive head of the Thomson-Houston Electric Company, and who has, not inappropriately, been called the "Col. Tom Scott of electric lighting," met a number of his New York friends at the Electric Club last week, where he was the guest of President H. C. Davis.

Mr. Joseph Howard, jr., the widely-known and always interesting journalist, has decided to investigate the fascinating qualities of electricity. As an excellent beginning he has become a member of the Electric Club, and the readers of those metropolitan journals that are made entertaining by the writings of "Howard," will no doubt soon have fully explained to them what electricity is—or, if not what it is, what it should be.

Mr. S. A. Barton, of Chicago, was a New York visitor last week. Since establishing the western headquarters of the Thomson-Houston Company in the Garden City, Mr. Barton has made the business of the Chicago end of his great company almost, if not quite, equal to that of the home office. This is not only an indication of the rapid development of the West, but is the well-earned result of the indefatigable energy and the alert, wide-awake business methods of Mr. Barton. The fact that Mr. Barton wore to the Electric Club, a particularly elegant sable-lined overcoat proved to his friends in that organization that Chicago could not yet substantiate its claims as a mild winter resort.

A New Small-Power Motor.

There was on view at the Saltaire Exhibition a steam engine and boiler combined (Wormald and Hargreaves' patent), made by the Leeds Engineering and Hydraulic Company, says our London namesake. Its construction is remarkably simple, and it occupies less space than any other steam engine and boiler of the same power. There are no working parts to get out of order, all stuffing boxes and glands being done away with, and the principal bearings being made self-adjusting. The fuel may be coal, coke or wood, and the whole arrangement can be mounted on wheels if required to be portable. Recently a larger engine of this kind has been used in the printing of a newspaper at Brighouse, and the proprietor gives the following particulars of it: "The engine is compound, with 6 and 8½-inch diameter cylinders, 5-inch stroke, with trunk pistons. The cylinders are suspended in the steam space of the boiler, thus perfectly steam jacketing them and preventing all loss from condensation. The two slide valves are worked from one eccentric, and there are no stuffing boxes except for the valve spindle. On the top of the boiler is a neat cast-iron box, in which is fitted the bearings for the crank shaft, and it also covers in the whole of the working parts. The boiler has a mild steel fire box fitted with two Galloway tubes. It is mounted on a cast-iron cistern, from which the feed water is taken by a pump fixed on the side. The water is heated in the cistern by the waste heat from the boiler fire. All the working parts are easily accessible, and all the lubrication is done from outside the box or covering The engine is the first of its kind turned into the market, is an improvement on one which has had nearly a twelve months' test at the company's works, and is likely to supply a growing demand for good, economical, and at the same time 'reliable' motors. Tested with coke as fuel, the cost of running has been one farthing per horse power per hour on the brake giving off 5 horse power. The engine and boiler occupy a floor space of 4 feet by 3 feet 6 inches. Being covered with silicate of cotton, neatly lagged and polished, there is little or no radiation from the boiler, and the whole presents a neat and very compact appearance. The only essential parts visible are a couple of 3-feet fly wheels, each weighing about 2½ cwt., the governors, and steam and water gauges."

The "1888" Type "E.P.S." Accumulator.

Our London namesake says that an entirely new form of construction mechanically will characterize the cells that will be supplied by the Electrical Power Storage Company after January 31st. The use of india-rubber bands, glass slabs, and similar devices for binding and supporting the plates is entirely abandoned. The plates are so arranged that there is no possibility of internal short circuits caused by the lodgment of plates or pellets of oxide or powdered paste at the bottom of the cells.

By an exceedingly ingenious device the opposite electrodes of the plate sections can, when necessary, be taken apart in a few minutes, and the peroxide plates removed *en bloc* without disturbing the spongy lead plates, and can be replaced with equal rapidity and certainty. By supplying a greater quantity of electrolyte, free circulation of the acid is obtained, while the rise and fall in specific gravity is correspondingly less, and the output and capacity for increased rates of discharge is very considerably increased.

The hard alloy grids adopted some twelve months ago have given the greatest satisfaction under very severe tests, so that with the above-mentioned improvements, the perfected E P.S. battery should prove a great inducement to the formation, development, and ultimate success of central station lighting companies, while the increased durability and ease of attention should favorably affect the progress of electric lighting of mansions, private houses, ships, factories, etc.

It is proposed to extend the before-mentioned arrangements, together with others, to meet the special requirements of the case, to cells intended for traction and other motive power purposes; the results of experiments up to the present having shown considerable advances in the capacity to withstand the disruptive effect of very high rates of discharge.

Water Power from the Bowels of the Earth.

The turbine water wheel connected with the mammoth artesian well in the rear of the Ponce de Leon Hotel, St. Augustine, Florida, was put in operation January 7th. The trial resulted very satisfactorily, says the Jacksonville *News-Herald*, the great wheel making 850 revolutions per minute, and successfully demonstrated that the power afforded by artesian wells can be practically utilized. The wheel will be used for running the dynamos and for other purposes about the hotel

Novel Use of Electricity.

At the Royal Institution, London, Mr. Wimshurst has exhibited an exceedingly interesting experiment, in which small type, placed on a disk revolving several thousand times a minute, was distinctly seen and read while in motion. This was accomplished by means of an electrical arrangement which caused brilliant sparks to illuminate the print at the exact instant only when the type was vertical. But for the buzzing produced by the great velocity of the disk the words would have been supposed to be at rest. This beautiful application of the electric spark gives a ready means of observing any and all changes which may take place in either matter or machinery in rapid motion.

Incandescent Lamp Globes.

The common practice of surrounding incandescent lamps with opal globes, or globes of ground glass, leads to a loss in the one case of from forty to sixty per cent. of the light, and in the other of from twenty-five to thirty-five per cent. A simple method by which the character of the light can be softened without experiencing so great a loss of intensity has been proposed, and consists in covering the globe of the lamp with a film of ordinary collodion, which can, by adding successive films, be made of any desired thickness. The reduction of the light of the lamp does not, it is said, with this method exceed ten per cent., and the system possesses the further advantage that the film can at any time be removed by simple friction.

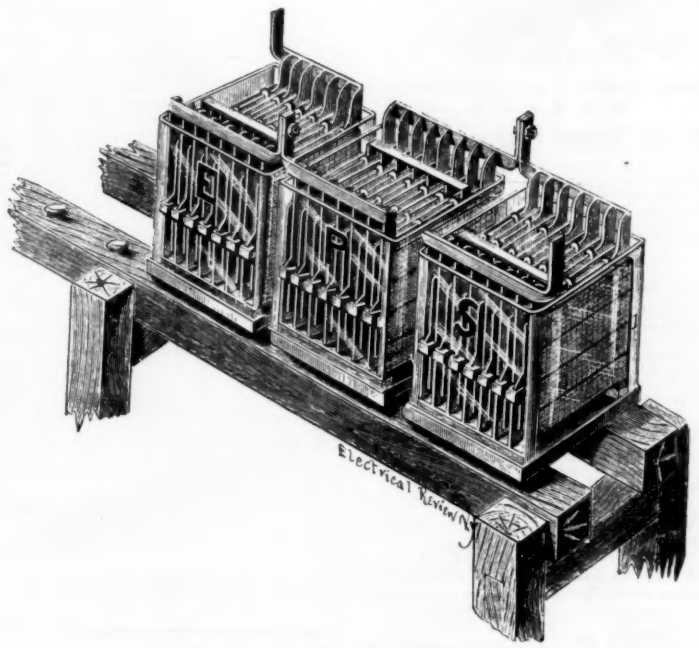
The collodion should be applied cold, and the globe should be thoroughly dry and clean beforehand.

Modern Uses of Electric Lights.

An electric light was recently used to find a body under water, near Boston. It was first demonstrated by the United States Government that the electric light could be used to good advantage in the deep. The Government uses it effectively in the capture of fish, and the steamer Albatross, in the service of the Fishery Commission, is provided with a full equipment of lights to use for that purpose. The lights are incandescent, but the glass is much heavier than that used in lighting rooms. It is encased in a wire netting, which acts as a guard and prevents breakage.

The net also acts as a trap. The light is connected with the dynamos with specially constructed cables. The fish, being attracted by the light, swarm into the net, which is then closed and pulled in. The specimens not wanted by the commission or the steward are restored alive to their natural element. The light can also be used in the recovery of dead bodies from wrecks, and is destined to be an invaluable aid to divers. It is said that some Gloucester fishermen contemplate using the light in their business.

—— At Petersburg, Va., a 500-light plant of the Thomson-Houston alternating system is being put in. Mr. Charles L. Swain is the superintendent of the electric light company of that city.



A New Type of Accumulator.

The Utica Electric Light Plant.

To the Editor of Electrical Review:

On the 27th day of October, 1887, the New York Electric Construction Company, through its representatives, Messrs. Wilbur, Carman and Cartwright was awarded a contract to light the streets of the entire city of Utica, N. Y., for a term of three years, from January 1, 1888. The contract was signed November 7, 1887, and the company went to work to fulfill its contract. The old boiler shop of Wood & Mann Engine Company was leased and contracts were let for the various portions of the mason, carpenter and machine work, and on November 17th the first piece of machinery arrived. With a display of quick work and push that has seldom been equaled the installation of the plant was hurried to completion; and on December 31, 1887, the lights were started in the presence of a large number of the prominent citizens of Utica, and their ladies, considerable enthusiasm being manifested Some idea of the magnitude of this undertaking can be formed when it is stated that the plant consists of four 150 horse power Cunningham iron works tubular boilers, one double Geo. H. Corliss engine of 600 horse power, and a fly-wheel 24 feet in diameter, with a four foot face. The belting used up the backs of 646 steers (not "cows" as the New York *Tribune* recently stated) Four lines of shafting are arranged with 20 Frisbie & Co.'s patent friction clutches. There are in use 15 dynamos of the Ft. Wayne Jenney system, with a capacity of 30 lights each; 12 of the Star Iron Tower Co's 125 feet towers; 250 of their O'Beirne mast-arms; 50 miles of No. 5 wire, and nearly 1,200 poles, and one of the 1,600 light dynamos of the Slattery alternating system, manufactured by the Ft. Wayne Jenney Company. That this plant should have been finished in the allotted time is principally due to the pluck and energy of the company's vice-president, Mr. John H. Hapgood, and he is to be congratulated on his success. In its details of construction and plan the station is a model. As the Utica papers say, it looked like the Machinery Hall of some great exposition. The ponderous engine standing on its bed, 10 feet above the floor level; the four tandem belts, two each way, and the line of dynamos running down on floor, remind one of the days of Gulliver and the pigmies. Out on the street the general illumination approaches moonlight, and Alderman Murphy, of the Fourth Ward, goes so far as to declare that he has got five moons (towers) in his district. The officers of the Utica Electric Light Company are: Henry D Pixley, of Utica, president; John H. Hapgood, of New York, vice-president; Jas. C. DeLong, of Utica, secretary and treasurer. Trustees. W. E. Lewis, Chas L Bernheim, T. Solomon Griffiths, Jos. Moore, C. J. Everett, Edwin F. Ames, A. L. Soulard, Frederick G. Cartwright, Myer Hellman.

R. B.

Utica, N. Y., Jan. 23, 1888.

For the Delegates to the Electric Light Convention.

To the Editor of Electrical Review:

Please announce through your columns that Mr. George F. Porter, No. 1112 Arch street, Philadelphia, will make the necessary arrangements in regard to railroad rates for Eastern members for the next meeting of the National Electric Light Association in Pittsburgh. Any one desiring information will please communicate with Mr. Porter.

S. A. Duncan,
Pittsburgh, Jan. 20. Chairman Ex. Com.

Mr. George S. Bowen, of Elgin, Ill., has arranged for a Western rate of one and one-third fares. From Chicago, $12 to the Convention, and $4 returning. The reduced rates cover all leading Western points Delegates should communicate with Mr. Bowen at once. A special car will leave Chicago Monday P. M., February 20.

—— A correspondent signing himself "Stupid" requests information regarding electric lighting. If Mr. "Stupid" will let us know his name and address his query will be answered.

—— The Citizens' Electric Light and Power Company has concluded arrangements by which it will light Slatington, Pa., by the latter part of January. The Richter Electric Light Company, of Camden, N. J., will put up the plant and put in the lights. The entire cost will be about $10,000.

ELECTRIC LIGHT NEWS

—— Another decision favorable to the Bell telephone patents has been added to the long, unbroken list. This time the Republic of Mexico was the battle-field.

—— Proposals are wanted at Lancaster, Pa., until February 17, for lighting portions of the city by electricity. Address William Riddle, chairman lamp committee, mayor's office.

—— The Edison Electric Light Company, of New York, has ordered of the Armington & Sims Engine Company, of Providence, twenty-two engines of 200 horse power each. This is a very satisfactory order to start the new year with.

—— The Brush Electric Light Company, of Rochester, N. Y., now has 1,132 arc lamps and 1,100 incandescent, and is furnishing power to the extent of 152 electric motors in sizes from one-eighth to eight horse power. This company uses for furnishing their station power fifteen double 15 inch turbine wheels, under 90 foot head of water, and have at present 24 No. 8 Brush dynamos and 2 No. 7.

—— A representative of the Edison Electric Light Company was in the city yesterday, looking over the buildings of the Gas Company, preparatory to putting in the machinery and setting up the plant for the incandescent light. The Edison people are very busy at present, with the installation of new plants all over the country, but just as soon as it is possible a man will be detailed to this city to stretch wires and get the dynamos running. —*Oswego (N. Y.) Palladium.*

—— "I ain't a-going to be swindled any more by them gas companies," remarked a Detroit citizen of more means than education. "I have just had the meteor taken out, and I'm going down to the eclectic works and order some of them indecent lights put into my house," and that was the way the incandescent light came to take the place of gas in one connection and household. For one reason or another, a similar substitution is going on rapidly in residences and business places all over the country.

—— The stockholders of the Nashville Power and Lighting Company, originally the Brush Electric Light and Power Company, have elected the following directors for the ensuing year: Wm. Porter, C. W. Peden, T. Herbert, Robt. L. Morris, Wm. M. Duncan, B. Lanier, J. H. Yarbrough, John F. Bowers and Max Sax. The directors elected Robt. L. Morris president and Jos. Wills secretary. The company contemplates an enlargement of the plant for incandescent lighting, and will also probably begin furnishing electric motor power for small machinery.

—— The death of Mr. Phillips, of Kansas City Electric Light Company, stopped work on the building for supplying the Edison incandescent light, and since then things have remained in *statu quo*. Mr. E. R. Weeks, manager of the Kansas City Electric Light Company, states that it is the intention of the consolidated companies to continue the work on this building according to the original plans. The building will be of stone, five stories high, cost $150,000, and is intended for a manufactory of electrical apparatus, a supply warehouse, and for the Edison incandescent electric plant.

—— The sparrow has a friend in Boston. One of these much-abused birds got into the globe of an electric lamp just before the hour for turning on the current, and didn't seem to know enough to get out. A little crowd assembled to see what would happen when the current was turned on, but before the catastrophe an elegantly dressed man, accompanied by a lady, walked up. When he saw the situation he handed his cane to his companion, pulled off his kid gloves, climbed the slippery pole, to the great detriment of his good clothes, and, putting his hand within the lamp, released the bird, which flew away. The crowd applauded, and the gentleman went home for more good clothes.

ELECTRICAL PATENTS

(Copies of any Patents in the following List will be sent to any address on receipt of twenty-five cents.)

INDEX OF INVENTIONS FOR WHICH LETTERS PATENT OF THE UNITED STATES WERE GRANTED IN THE WEEK ENDING JAN. 17, 1888.

376,423 Car lighting; Craig R. Arnold, Brooklyn, N. Y.

376,541 Mechanism for electrically controlling stamping machines, etc., Ottmar Mergenthaler, Baltimore, Md.

376,562 Electric conduit; Robert Van Buren and James J. Powers, Brooklyn, N. Y.

376,567 Electric railway system; David G. Weems, Baltimore, Md.

376,569 Telegraphic apparatus; Samuel B. Whitehead, San Francisco, Cal.

376,583 Combined incandescent electric lamp socket and electrical converter; Edward A. Colby, New Haven, Ct.

376,601 Laryndoscope; Josef Leiter, Vienna, Austria-Hungary.

376,615 Support for telephone receivers; William E. Thurber and John McConnell, Cleveland, Ohio.

376,617 Combined gas and electric light fixture; Samuel B. H. Vance, New York, N. Y.

376,630 Electro-magnetic device; Charles F. Brush, Cleveland, Ohio.

376,651 Automatic electric valve; Charles J. Hexamer, Philadelphia, Pa.

376 661 Telegraph repeater; Joseph Kolzer, Duisburg, Prussia, Germany.

376,706 376,707 Magneto-telephone; Fred H. Brown, New York, N. Y., assignor to the Magneto-Telegraph Company, of New York.

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Thomson-Houston Electric Light, Herbert Wadsworth, Manager Western Office.
Brush Electric Co., Alex. Kempt, Special Agent.
Excelsior Electric Co., C. J. Reilly, Western Mgr.
Sperry Electric Light Motor & Car Brake Co., 201 Royal Insurance Building
J. H. Reid, General Manager of the Mather Electric Light Co., Chicago.
Wm. H. Purdey, Comm. of Public Works, Chicago
John Mab, Chief Engin'r of Board of Trade, Chic.
C. J. Meimes, Gen'l Sup't Thomson-Houston Light, Omaha, Neb.
J. A. Corbey, St. Joe Electric Light and Power Co., St. Joe, Mo.
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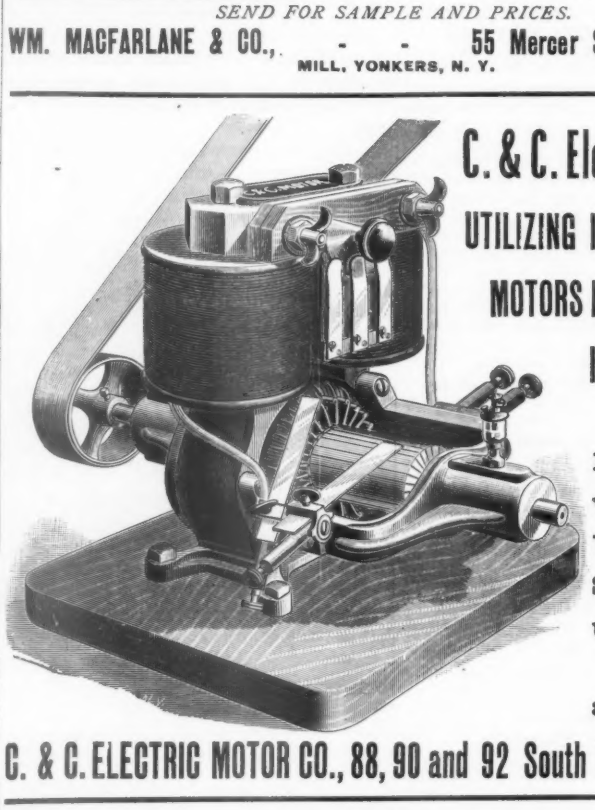

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